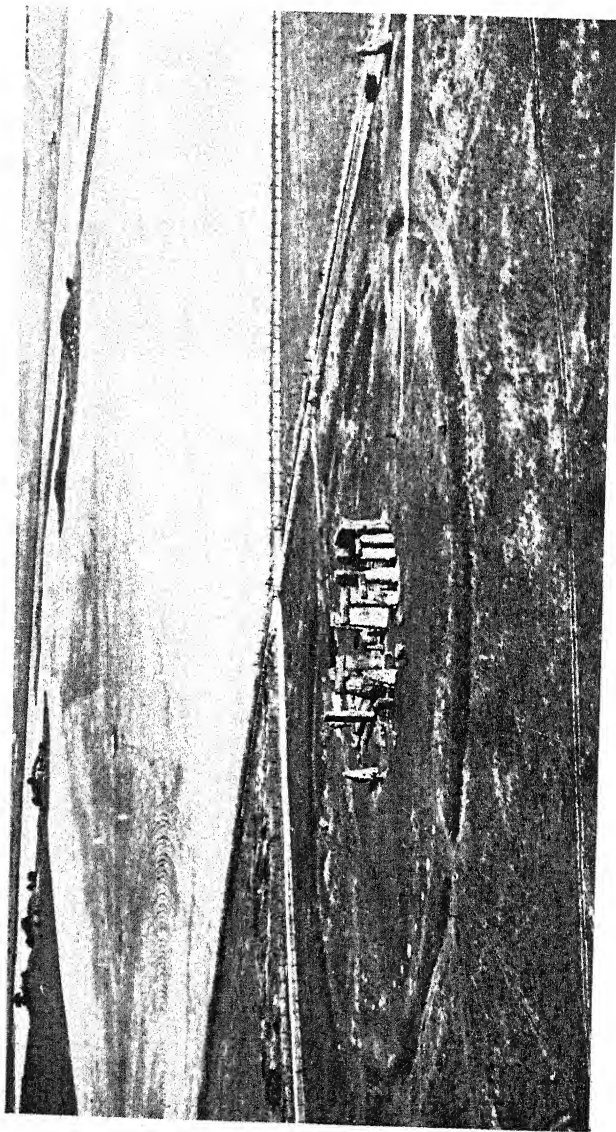


STONEHENGE AND
ITS DATE



1. GENERAL VIEW FROM THE AIR

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STONEHENGE AND ITS DATE

by
R. H. CUNNINGTON—

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WITH 14 ILLUSTRATIONS
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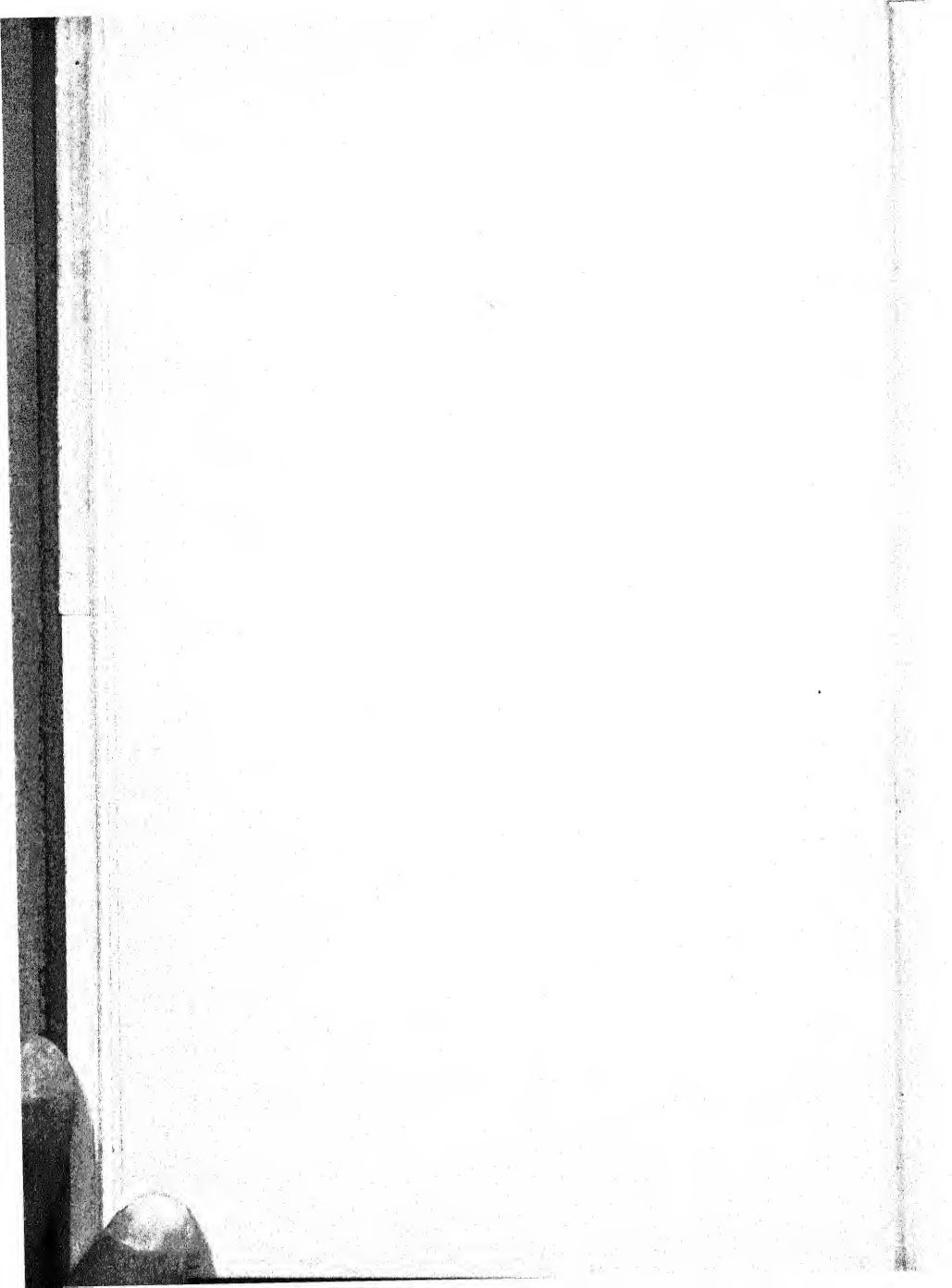
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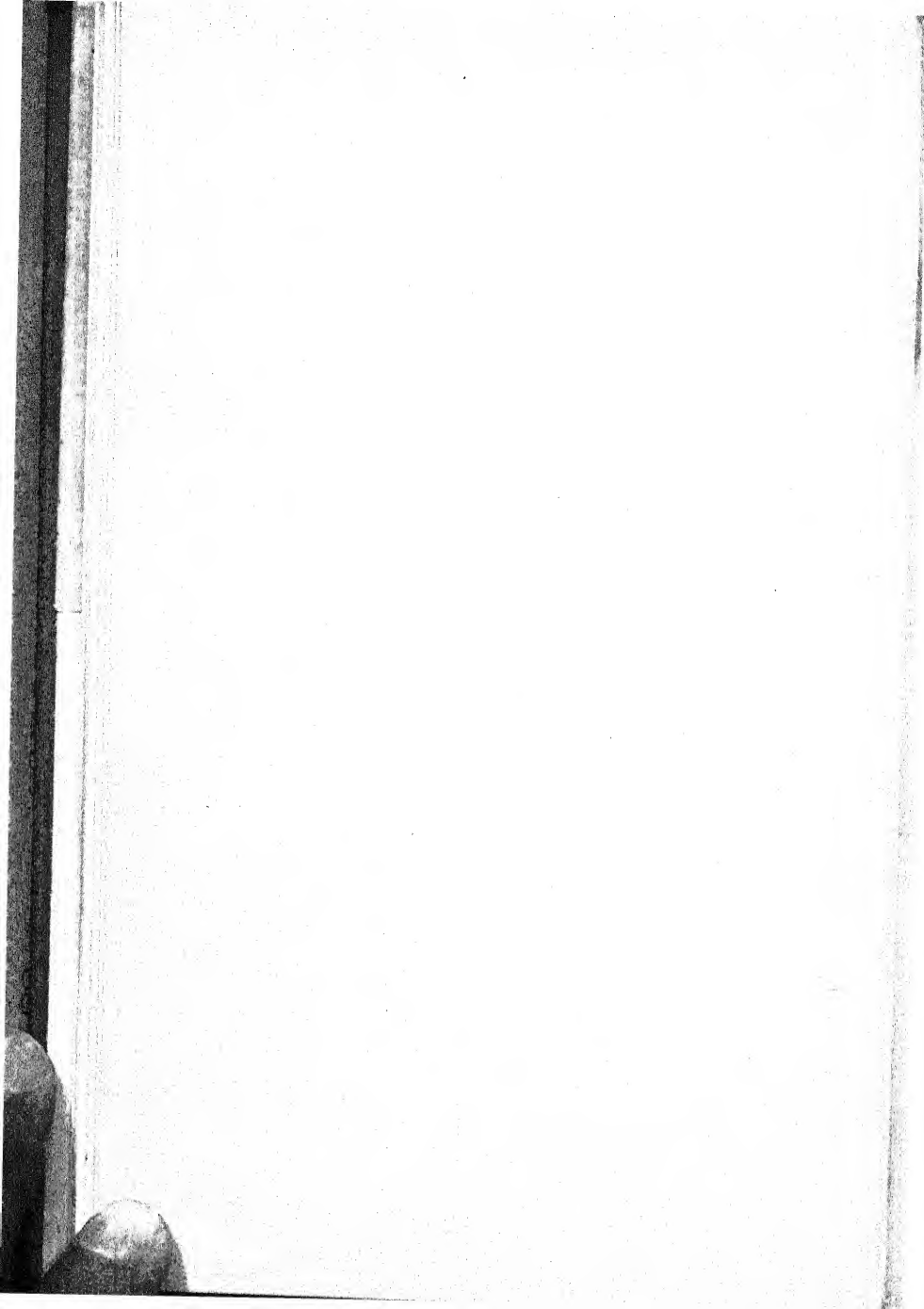
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* *From photos by C. F. Ashworth, Devizes.*



PART I
THE MONUMENT



CHAPTER I

GENERAL DESCRIPTION

THE time-table for charabancs visiting Stonehenge allows twenty minutes, and to most of the sightseers this is ample 'for a heap of old stones'. Others will be satisfied with the brief description and delightful illustrations of the official guide book, but there will, I hope, still be a few who have been so impressed with the grandeur and mystery of Stonehenge as to want a fuller account; and anything written earlier than the reports of Colonel Hawley's excavations is now very much out of date.

Its grandeur must be felt, and nothing I can say will influence those incapable of feeling it; but it may not be out of place to suggest that a company of indifferent sightseers is not giving Stonehenge its due. It should be visited in solitude or with the right company; and, if there is time, it would be well to leave the main road before the monument is in sight, and come to it by the old Avenue of approach from Larkhill, over the turf of the downs, with all the modern buildings of the Barracks out of sight and out of mind, and only the stones visible and growing gradually in majesty as one approaches them. Public munificence has ensured that no other buildings shall now disfigure the surroundings, and, but for its

fence—an unfortunate necessity—Stonehenge now stands alone.

The right time is also important: the early morning, before people or motor-cars are about, is obviously the best, and the earlier the better. Nothing can be more impressive than the first sight of Stonehenge looming through the mist of a summer morning, when the whole plain is empty, and only the morning lark breaks the silence. Midsummer morning would be ideal, before the sun has risen, so that we could watch its rise from the monument itself, and, if we choose, lose ourselves in the imagination of ceremonies long since past; but the night of midsummer is made hideous now with crowds of hilarious sightseers, and it is better to choose a day or two before or after. The position of the sun is practically the same, and the site, except on the day itself, is at that hour deserted.

To some people the grandeur of Stonehenge is sufficient, and for them the rest of this book will seem superfluous; but most of us want to know as well as to feel; and, when knowledge is beyond our reach, the mere statement of the problem has its fascination. In prehistory much of our so-called knowledge is no more than intelligent guesswork; and in the case of Stonehenge particularly, guesswork has often to be a substitute for fact; and, it must be acknowledged, not all of it has been intelligent. There need indeed be little fear of losing the mystery of Stonehenge by getting to know too much; and however much we know there will always be scope for the imagination, without which archaeology would be the mere raking over of dry bones of the past.

It is only recently that Colonel Hawley's excava-

tions, carried out between 1919 and 1926, have provided much real information to go upon; but he has left many problems still unsolved, and although more complete knowledge may be expected in course of time, further excavations should and doubtless will be left for a future generation, and all the data we are likely to have from digging at Stonehenge is now at hand.

So many stones are missing or have fallen that the original design is not easily traced, especially near the centre; but the main features, easily recognized from the plans, are, or rather were, as follows:

(a) The surrounding ditch and bank, and the Avenue.

(b) A circle of large 'sarsen' stones, connected together by lintels.

(c) An inner circle of much smaller 'blue stones'.

(d) A horseshoe of the largest sarsens arranged as 'trilithons', that is in pairs with a lintel over each pair.

(e) An inner horseshoe of the smaller blue stones.

(f) The prostrate 'Altar stone', placed at what may be called the focus of the horseshoe.

(a) *The Ditch and Bank*

A circular ditch with its bank is not uncommonly found surrounding a burial or stone circle; and, though in no way defensive, was probably intended to symbolize a barrier and to prevent encroachment. That at Stonehenge is of the usual character except that the bank is on the inside, instead of the outside, of the ditch, as with most of these ceremonial ditches; and it is a good deal smaller than the ditch at Woodhenge near by, or the still greater earthwork at Avebury in North Wilts.

The ditch is now partly filled with material that has fallen back into it from the sides and bank; but it was originally 6 or 7 feet wide at the bottom and 4 or 5 feet deep. These dimensions however varied very much, and the ditch is of the usual irregular type where the emphasis is on the bank, and the ditch is regarded merely as a quarry to provide material; there are two gaps of 10 and 3 feet length, besides the entrance, where it was never dug.

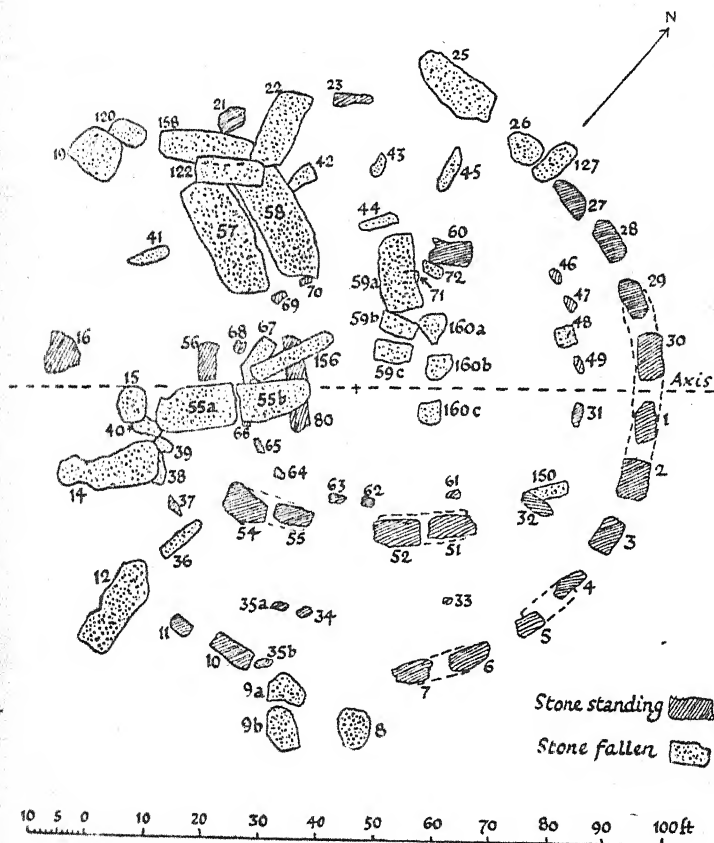
The causeway, forming the entrance, was not quite symmetrical and was only $37\frac{1}{2}$ feet wide, while the Avenue that leads up to it is 71. The contents of the last 30 feet of the ditch however was clean white chalk rammed hard, suggesting that the end had been purposely filled to widen the entrance and make it agree with the Avenue. In order to mark the ditch more clearly, Colonel Hawley has returned only about half of the material he dug out and has left the remainder on the bank; and he has not completely filled in that part which cuts into the Avenue. The Avenue is specially interesting from the orientation point of view, and it will be described in Chapter IV.

(b) *The Sarsen Circle*

Although many of the stones have fallen, the part next to the road is nearly complete, and the simple dignity of the plan needs no exposition. There were 30 huge uprights (5 are now missing and 9 fallen), placed at equal distances apart to form a circular colonnade, and over them was a continuous row of lintels. (See stones numbered from 1 to 30 on the accompanying plan.)

For the reasons explained in Chapter III, the

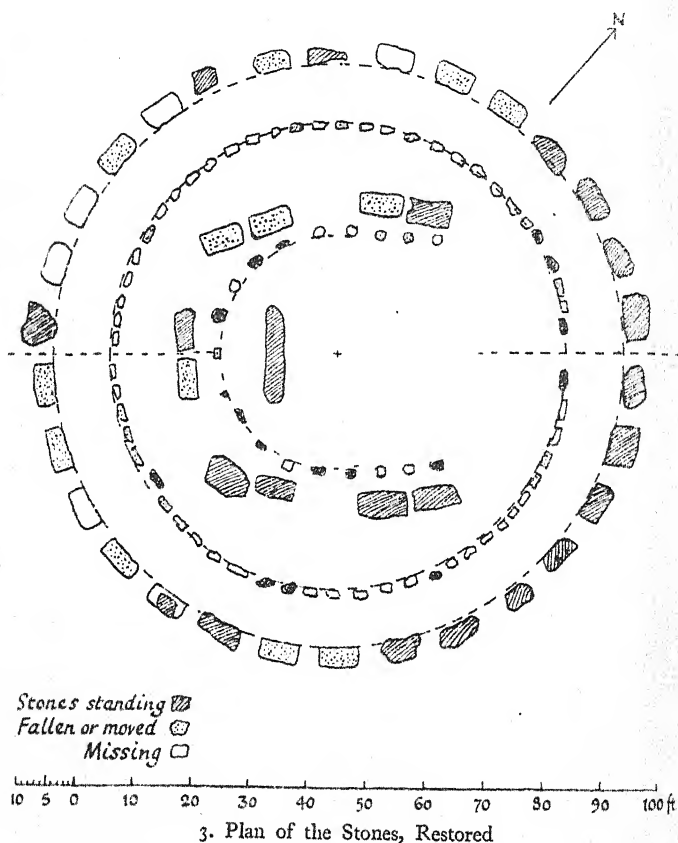
stones are not all the same size. The length varies, but the holes for their foundations have been dug to



2. Plan of the Stones, as Now

different depths so as to bring the tops to the same height, $13\frac{1}{2}$ feet, above the ground; and 4 or 5 feet, or even more is buried. They differ also in thick-

ness, the average being about 3 feet 9 inches; but this is hardly noticed because they are so arranged that the inner face of each lies on the circumference



of a true circle, which is $97\frac{1}{3}$ feet in diameter. The variation in width is the most conspicuous and disguises the very accurate centre-to-centre spacing of

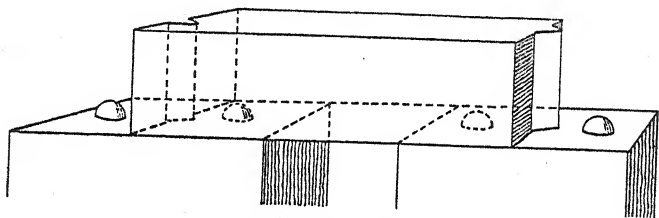
the stones; but the spacing is worth remarking, for in no other circle in Great Britain is there anything like the same regularity (see note to Chapter II). The average width is about 7 feet and the centre of each stone is 10 feet 2 inches from that of its neighbour, the circle being accurately divided into 30 equal parts.

There is however just one exception and that a most interesting one. The two stones at the entrance, Nos. 1 and 30, are 12 inches farther apart than any of the others, the extra width being gained by shortening the intervals between them and their neighbours, Nos. 2 and 29, each by 6 inches. The difference is hardly appreciable, yet it has been evidently made on purpose, and like several other similar refinements in detail, it has been discovered only by careful measurement. It is too soon yet to discuss what these may imply.

The average size of the stones is about 18 feet by 3 feet 9 inches by 7 feet, but they taper a little towards the top, and making allowance for this, their average weight must be about 26 tons. There is one exception, No. 11, which is much smaller; probably it is merely the core of a full-sized stone that has been worn away by weathering or split by fires; and the upper part has evidently been broken off.

The lintels average 10 feet 6 inches in length, 3 feet 6 inches in breadth, and 2 feet 8 inches in depth, and they weigh a little less than 7 tons. They are not quite rectangular, for the outer face has been trimmed to the curve on which they lie; and as they vary a little in depth, the ends resting on the up-rights have been trimmed to bring the tops to the same level, while the intermediate portion is sometimes deeper.

Lintels are a unique feature in stone circles, and the way in which they are secured to the uprights has been thought to indicate previous experience in working with timber; but this is only to be expected, and it does not follow that Stonehenge need have had a prototype in wood. In the architecture of almost all races the craft of the mason has shown its early dependence on carpentry, and man was doubtless always an adept with wood long before he built in stone. At Stonehenge the uprights are given two projections or tenons, one near each end, and the lintels have corresponding sockets or mortices that



4. Jointing of Lintels

fit over them. The ends of each lintel are also cut with 'toggle joints', one end with a groove and the other with a projection, so that the groove of one fits into the projection of its neighbour. Even this was not considered sufficient, for the tops of the uprights have been cut with a raised edge like a shallow tray, and the lintels to match have a corresponding recessed margin. Colonel Hawley, who had an opportunity of examining them closely when the lintels over No. 1 stone were reset, considered the tops of the uprights must have been dressed after they were erected, and suggests that the lintels were

slung (or otherwise held) over them, and tested again and again until an exact fit was obtained. Of course these parts being protected had weathered comparatively little, but even the exposed toggle joints fitted so well 'as to make it difficult to return the lintels to their former places'.

How all this work of cutting and fitting was done will be described later, as also the probable method of erection. The accuracy of the work is emphasized because it shows what the builders were capable of doing, and this has an important bearing on the date, and also on the possibility of an accurate orientation.

(c) *The Inner Circle of Blue Stones*

These stones, numbered 31 to 49 and 150, are not only unequal in size, but are very indifferently aligned to a circle which is about 78 feet in diameter. The entrance stones, Nos. 49 and 31, are set well within instead of on the circumference, and at the wide interval centre to centre of 8 feet 7 inches; but the other stones were much closer together. The writers of the seventeenth century, when there were more stones standing than now, supposed the original number to have been 30, which would give an interval centre to centre of 8 feet; Stukeley in the eighteenth century, judging from the few that are left, supposed the normal interval to have been 6 feet, and the number of stones 40; and his estimate has been generally followed by later writers.

Colonel Hawley's excavations, described on pages 8 to 12 of the *Antiquaries' Journal*, Vol. VI, show that far more stones are missing than any one supposed: he dug along the line from stone 33 of the

circle to the fallen trilithon stone 57, or very nearly half the circle, and found everywhere that the stones stood originally only about 18 inches apart. The holes for them were connected together by a continuous trench evidently dug to loosen the stones before knocking them over; and part of a seventeenth-century glass flagon was found in it. The stones must have been very close together or the robbers would not have dug a continuous trench to get them out; and he was able to find the actual distance from the base of the holes at the bottom, and sometimes by the broken fragments, or the actual stumps of the stones themselves.

Since these are flat stones, only 9 or 10 feet long, and of a convenient width, it is easy to understand how tempting they must have been to the farmer in need of stones for bridges or gateposts in this stoneless district. Inigo Jones, who wrote in 1621 while the destruction was still going on, remarks how they 'might easily be beaten down or digged up'; and goes on to tell how, since his first measuring of Stonehenge 'not one fragment of some of them standing is now to be found'.

Taking the average width to be $2\frac{1}{2}$ feet and the average distance apart to be 18 inches, the number of stones would have been about 60, or two to each stone of the sarsen circle. It is unfortunate that Colonel Hawley does not record the number of holes or stumps found over a given length, or we might have a more certain estimate; but the evidence he gives is quite sufficient to prove that this number is approximately correct, and that the old estimates of 30 or 40 are far too small. The point is stressed because it so happens that the revised estimate has

an important bearing on their date, and indeed on that of the whole monument (see p. 120).

One of the stones, No. 150, has given rise to much controversy, and an explanation is still to seek. It has fallen, but one end seems still in position, so it doubtless formed part of the circle; but it has been cut with two cup-shaped hollows like mortices, as if the stone had been intended for use as a lintel. Recently another fallen stone, No. 36, has been found with the same peculiarity, and there may of course have been others now lost. None are known to have corresponding tenons. It has been supposed that they are the remains of an earlier lintel circle erected elsewhere; but as Stonehenge is unique in having lintels, or in having dressed stones at all, this seems hardly likely, especially as none of the circles of the Prescelly district where the stones came from (see p. 39) are at all of an advanced type. It is much more likely that they were cut at Stonehenge with the intention of using them as lintels, and that they are now among the circle stones in consequence of a change in plan or a reconstruction.

Perhaps the most interesting thing about the blue stones is their origin, and what is known or surmised about this will be described in Chapter III.

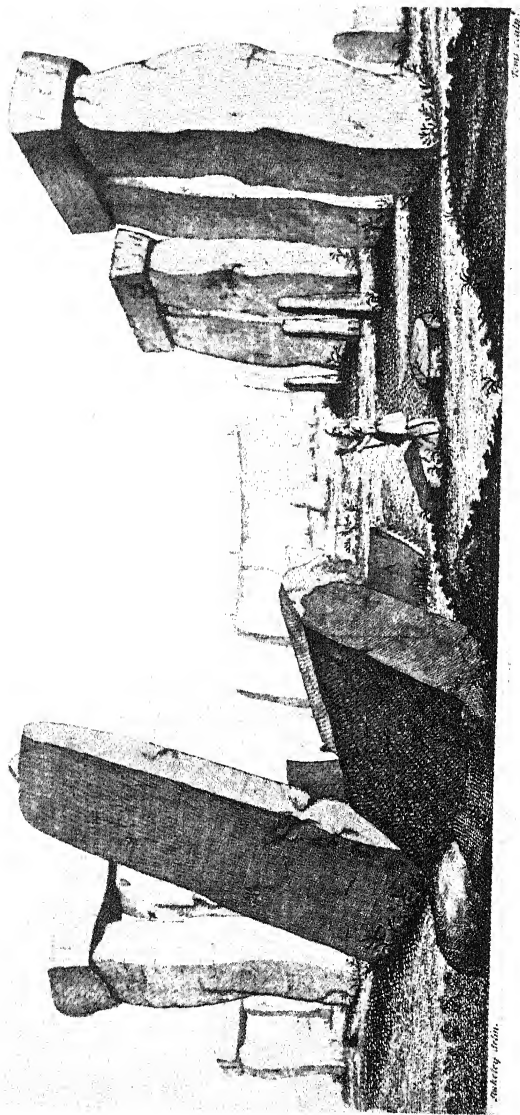
(d) *The Horseshoe of Sarsen Trilithons*

Five pairs of huge stones, Nos. 51 to 60, each with a lintel, originally stood within the circle in the form of a horseshoe. Two pairs on the southern side are still standing; the central pair has one of its uprights left; but of the northern pairs only one stone remains upright, and some effort of the imagination is needed to reconstruct the plan from the

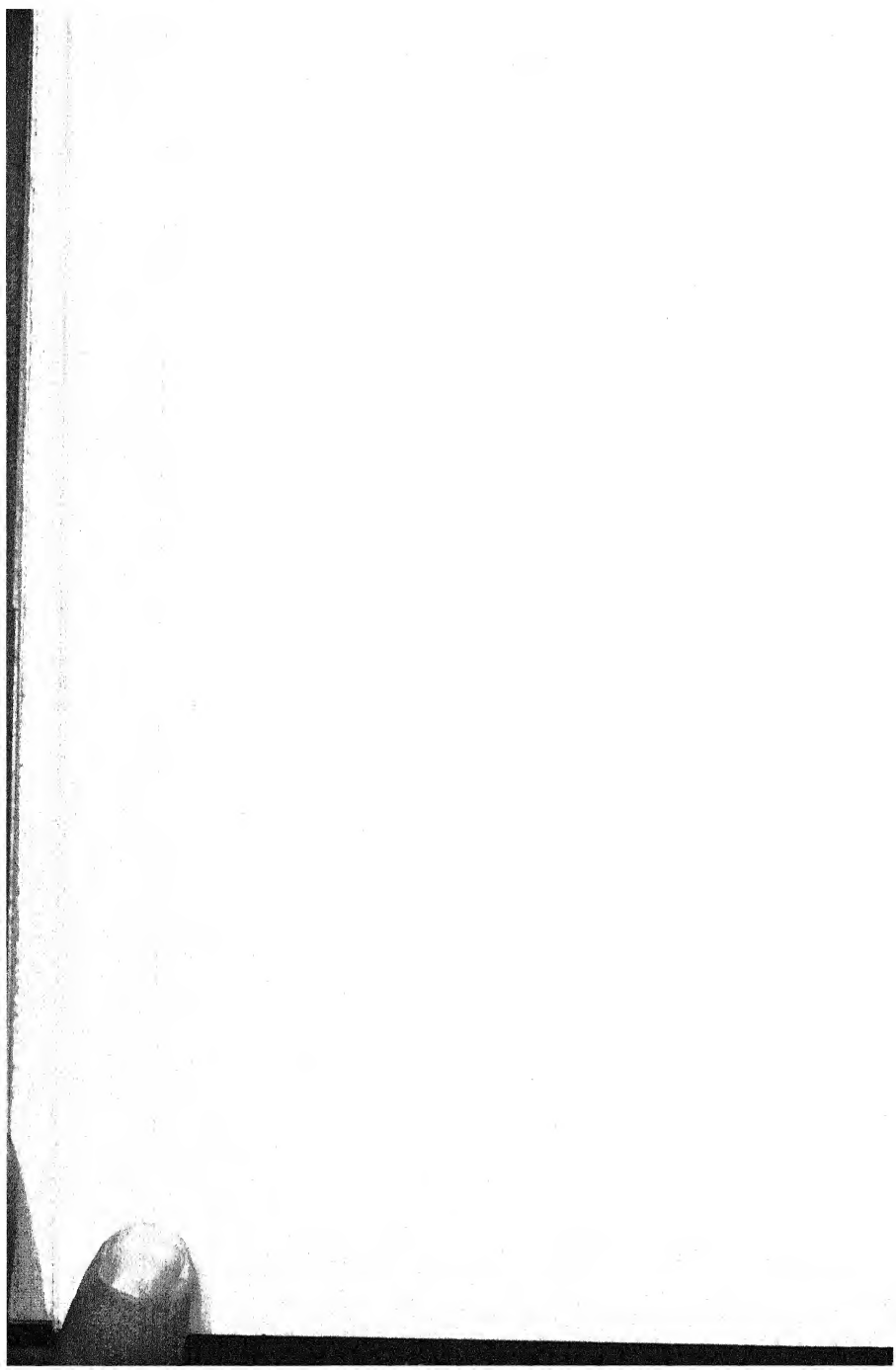
debris of fallen blocks, and to realize how grand and indeed awe-inspiring must have been their appearance.

One of the northern pairs (Nos. 57 and 58) fell late in the eighteenth century, and a contemporary account tells how it took place after a sudden thaw succeeding very deep snow, and how the concussion was felt half a mile away. They were already leaning a little, and it was found that the bases had been buried only some 4 or 5 feet in the ground; but the principal cause of the fall was probably a gipsy shelter that had been dug at the foot of the stones.

The single stone of the great central trilithon (No. 56) was until recent years also leaning, and year after year the tilt was found to increase, so in 1901 it was enveloped in timber scaffolding, the foundations were cleared out, and it was very carefully pulled up-right. A few years later some of the sarsen circle stones, which were leaning and had been propped with timber, were treated in the same way and given secure foundations in concrete; and it is sad to think that the northern trilithon might also have been saved if it could have stood a little longer, and been subject to the greater care now taken with Stonehenge and our other national monuments. Stukeley's drawings, made in 1722, which are reproduced here show what they looked like before the fall; and what they may have looked like originally. The fellow to No. 56 was supposed by Aubrey to have been brought down by the Duke of Buckingham when treasure hunting at Stonehenge in 1620, but we must probably acquit the Duke of this, whatever other harm he may have done, for the earliest picture of Stonehenge dated 1574 shows



5. THE TRILITHONS IN THE EIGHTEENTH CENTURY
From Stukeley's *Stonehenge*



one stone missing and its fellow already leaning; also the earliest detailed description, that of Inigo Jones in 1621, notes that one stone was down, but says nothing of a recent fall. When the leaning stone was pulled upright no less than 8 feet was found to be below ground. Its fallen fellow (now in halves and numbered 55*a* and 55*b*) is 4 feet shorter and can have had only 4 feet buried; to compensate for this the lower end was nearly twice as thick underground as above, showing incidentally what an immense amount of trimming has been done to reduce the part that showed to its present comparatively slim proportions.

The five trilithons were very exactly graduated in height. The centre pair was the tallest, standing 22 feet above the ground; on each side of it they stood at 17 feet 9 inches; while the outer pairs were 16 feet 6 inches. The other dimensions are the same for all the uprights, viz. 7 feet 6 inches tapering to 6 feet 6 inches for the width, and 4 feet tapering to 3 feet for the thickness. The longest stone of the central trilithon measures just under 30 feet in length, 7 feet in average width, and 3 feet in average thickness, and must weigh nearly 50 tons; its fellow with the thickened base must have weighed very nearly as much. Except for some of the unhewn stones at Avebury they are much the largest monoliths in this country.

The lintels over each pair average 16 feet in length, 4 to $4\frac{1}{2}$ in breadth, and $3\frac{1}{2}$ in thickness, and are very accurately levelled. They are 6 inches wider on the upper surface than below, with the evident intention of eliminating the effect of perspective; and all are cut with a convex curve on the

outer face to match the curve of the horseshoe. The fastening to the uprights is by tenon and mortice joint, similar to those in the sarsen circle, but with only one tenon to each upright: that on the famous 'leaning stone' (No. 56) is a conspicuous object in all the early prints, and catches the eye of the most casual visitor.

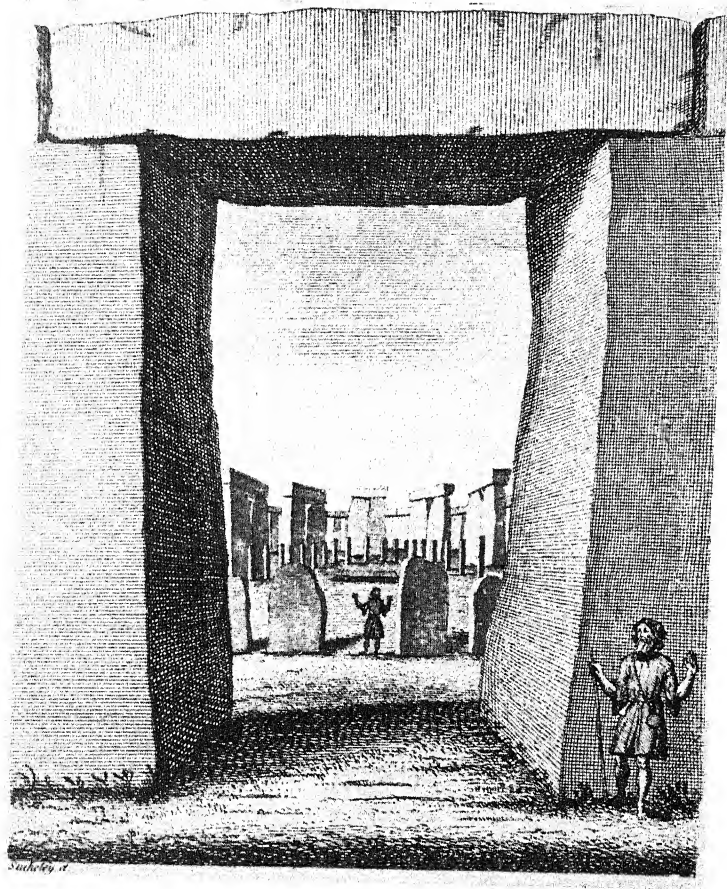
(e) *The Inner Horseshoe of Blue Stones*

These were evidently selected stones, and they are all trimmed to a sort of obelisk shape with flat tops. The average thickness is about 2 feet, and the heights vary from 6 to 8 feet, the taller being in the middle of the curve. It is supposed that there were 19 (of which 12 including stumps remain), arranged with one in the centre and nine on each side. The spacing is very regular, 6 feet 4 inches centre to centre for those on each side of the central stone (which is a specially wide one), and 5 feet 4 inches for the remainder; and the curved portion is very accurately the arc of a circle.

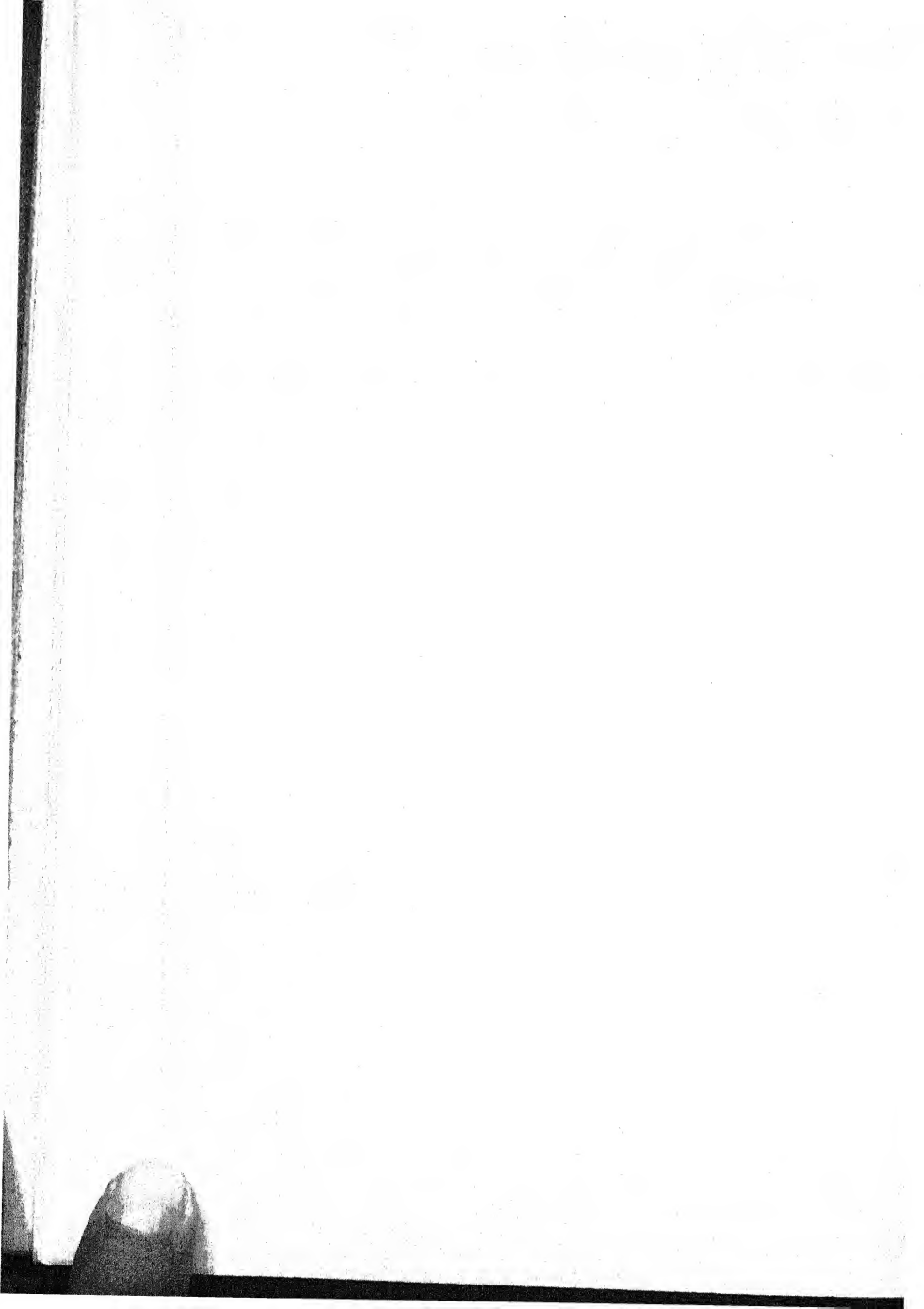
Colonel Hawley's excavations suggest the possibility that at one time the horseshoe was closed, or intended to be closed, into an oval by four more stones, the holes of which were found between Nos. 61 and 72 (see *Wilts. Arch. Mag.*, Vol. XLIV, pp. 344 and 345). The central interval for these holes, except at the entrance, is 11 feet, or almost exactly double the normal spacing, and the entrance interval is 7 feet.

(f) *The Altar Stone (No. 80)*

The name was invented by Inigo Jones in the seventeenth century, and the present-day archaeolo-



6. THE INNER CELL, RESTORED
From Stukeley's *Stonehenge*



gist, though he dislikes such suggestive titles, has to put up with it. The stone is 16 feet long, 3 feet 4 inches wide, and 1 foot 9 inches thick. It lies on the ground nearly, but not quite, at right angles to the axis, and its centre is a little to the north-east of it; but it may originally have been truly symmetrical and been displaced by the fall of the big trilithon stone, which now lies on top of it (see p. 64).

There are some who think that it once stood upright, and an upright stone within a circle is often the site of a burial, suggesting that Stonehenge was originally sepulchral. Also if it stood centrally on the axis, it would hide the view of the rising midsummer sun from behind the central trilithon, and would give less reason to suppose that Stonehenge may have been a temple to the sun, or indeed have had anything to do with it. While if the stone was flat, so that the sun's rays could fall on it and yet not be hidden, some ceremonial purpose is suggested, and it may even have been an altar stone. There is some object therefore in the attempt to discover its original position. The chief argument for an upright one is that such stones are well known, while a flat stone so placed would be unique. On the other hand Stonehenge has many unique features; and a possible parallel has now been found in the position of the child's grave at Woodhenge (see p. 97), so its uniqueness is disputable.

The evidence of excavations in search of the hole it may have stood in is conflicting and none of it recent. Stukeley, who dug near the middle of it in 1723, found no hole and says that the solid chalk lay within a foot of the surface. William Cunnington however, when digging 'about the same place', some

80 years later, found moved chalk to a depth of nearly 6 feet (Colt Hoare's *Ancient Wilts*). Cunnington's hole may have been excavated by treasure hunters, though the contents do not suggest it, or may perhaps have been part of the excavation round stone No. 56, which Gowland found extending to an unknown distance in this direction (*Archaeologia*, LVIII). In any case the stone can hardly have fallen so as to lie centrally over its hole, so it could not have stood symmetrically on the axis; and on the whole the evidence seems decidedly in favour of the present prostrate position being original.

The Altar stone is a micaceous sandstone from the Old Red formation, and is the only one of that nature in the monument. It is much the largest of the foreign stones, which are seldom more than 10 feet long, and probably for that reason, rather than from its exceptional geological character, it has been chosen for this dignified position.

NOTES

1. *The Lost Stones*

A good many of the sarsen uprights have fallen but only five are missing. Some of the falls are comparatively recent: Nos. 13 and 14 are seen standing with their lintel in the picture dated 1574; No. 14 was still up in 1747, but fell before the end of the century. The trilithons 57 and 58 fell in 1797, and stone No. 22 with its lintel as lately as December 1900.

The stones are much more firmly planted than is usual in prehistoric monuments; and their depth in the ground is three or four times that of the stones of similar size at Avebury. The latter depend

almost entirely on balance to remain upright, and quite big stones may be buried only 16 inches.

For this reason it is a little surprising that so much damage has befallen Stonehenge. There is a possibility that it may have been partly destroyed for political reasons (see p. 130); but without indulging in speculation it is easy to see how much of the destruction was done.

Nearly all the fallen lintels are missing, and a good many too from the uprights that are still standing. They are a convenient size like the blue stones, and like them, were probably taken deliberately; and if they were dragged off by ropes, the balance of the uprights themselves would have been upset. Accidental mischief has been a contributory cause, for gypsies used to dig pits for shelter and light fires against the stones; and treasure-hunters have been busy at their foundations. Relic hunters too have played their part, and Stukeley and Cunnington both lament the damage done by breaking the stones for specimens: unfortunately they were considered 'fictitious', and at one time to have had a medicinal value, so it was not only the professional geologist who was responsible. Most of the cavities in the stones were probably there long before the stones were set up, and actual weathering since is not likely to have played an important part: man has been the chief enemy, and we must not, in fairness to the builders, put the ruin of Stonehenge down to time alone.

2. *The Supposed Cup-markings*

It has been alleged that some of the stones are inscribed with the slight hollows or 'cup-markings'

that are occasionally found on megaliths, or even with other symbols. It is true that a few of the stones have been defaced, sometimes with the miscreants' initials (in the bad old days such things could happen); but the most careful search has failed to find any markings that can be ancient. (A full account of these real and imaginary marks is given in *The Wiltshire Gazette*, October 25, 1934.)

CHAPTER II

OUTLYING STONES, AND STONE AND POST HOLES

The Friar's Heel

THIS massive stone stands near the roadway and in the path of the Avenue, 256 feet from the centre of the monument, and a little to the south of the axis. It is 16 feet high with a pointed top and leans inwards; unlike almost, if not quite, all the other sarsens, it is a natural boulder without any trace of human workmanship.

It is usually supposed to be connected in some way with the midsummer sunrise, and its position outside the monument has been explained by the legend of the Devil and the Friar: it is as likely to be true as some of the explanations given. The Devil, employed by Merlin, carried away from Ireland the stones of Stonehenge in a single night, and set them up on Salisbury Plain. Well pleased with his work he was boasting that nobody should ever know how the stones got there, when a friar, who had been hidden near by, was rash enough to call out: 'That is more than thee can'st tell.' This put the Devil in such a rage that he hurled one of the stones at the friar, and struck him on the heel as he was running away. The friar escaped, but the stone to this day bears the imprint of the blow.

The story, which does not appear in print before

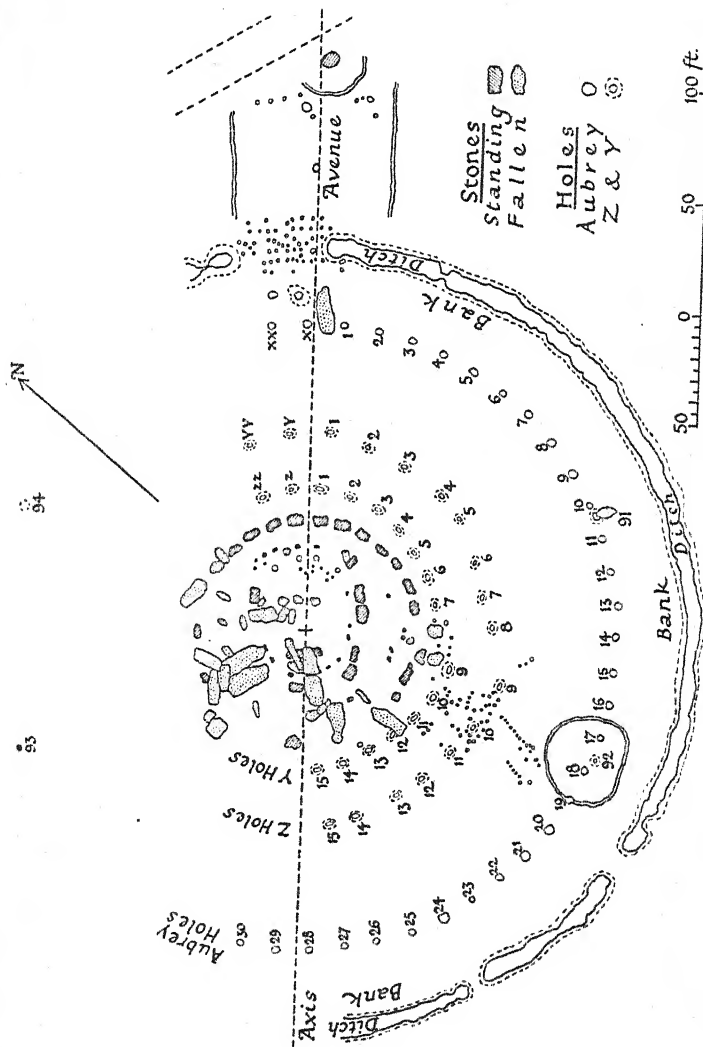
the eighteenth century, but must be considerably older, seems to have been invented to explain the name as well as the position, and evidently makes use of the legend told by Geoffrey of Monmouth, which will be related later.

Friar's Heel, especially 'Friar', is an odd name, though the part he plays in the story as an eaves-dropper is quite in character; and the alternative 'Hele Stone' is almost as mysterious. The usual explanation of the latter is that it is derived from the Anglo-Saxon word *helan*, to conceal; though what the stone conceals is not apparent. A more recently suggested derivation explains the full title as a corruption of the Celtic 'freas heol', and supposes the original name was 'cloch na freas heol', or 'stone of the rising sun'. Its relation to the midsummer sunrise will be explained in Chapter IV; meanwhile it is worth noting that the stone is the only one bearing a distinctive name not invented by archaeologists.

The recent excavations have proved that the Hele Stone was once surrounded, anyhow on its western side, by a roughly circular trench, 30 feet in diameter. This may have been a taboo ditch, guarding a sacred stone; or may have been dug for quite other purposes after the monument had fallen into decay: it seems unlikely that the Avenue should have been cut across by such an obstacle while still in use. There are similar ditches round two of the 'Four Stations', and the possible meaning of these ditches will be discussed later.

The Slaughter Stone

The name was given by Stukeley who also



7. General Plan

adopted and popularized Inigo Jones's name for the Altar stone; and with still greater reason present-day archaeologists have to apologize for it. There is indeed not the least reason to suppose that it had anything to do with sacrifice.

The stone lies near the ditch causeway, and its pointed end, which may have been in the ground, is 154 feet from the centre of the monument. It lies to the south of the central axis; and opposite it, at the same distance from the centre, a large hole was found with a piece of sarsen packing-stone at the bottom. The hole must have held a big stone, comparable in size with the Slaughter stone; and if this was not the Slaughter stone itself—which seems improbable—the two together would have formed a pair on either side of the axis like the portals of a gateway.

Inigo Jones in his description and plan of Stonehenge published in 1655 notices just such a pair of standing stones, but places them on the outer instead of the inner side of the ditch. The dimensions however correspond so closely (Inigo Jones's stones are 20 by 7 by 3 feet, and the Slaughter stone $21\frac{1}{2}$ by $6\frac{3}{4}$ by $2\frac{3}{4}$ feet) that there can be little doubt that he has made a mistake, and that the stones he saw were the Slaughter stone and its departed fellow, and that both stood upright on the inner side of the ditch. In such a position they must have been in the way of traffic entering the enclosure; and at some period between Inigo Jones (or rather Aubrey, whose plan shows two stones on the inner side in 1666) and Stukeley, one was entirely destroyed, and the other levelled to the ground. It was a common practice, if a stone was in the way, to dig

a hole round it large enough to bury it, and then pull the stone over into the hole. The Slaughter stone is now lying in just such a hollow; and there is a row of holes, such as the modern stone-breaker makes, to show that an attempt has also been made to break it up.

It will be noticed that the Slaughter stone would stand just about 100 feet clear of the sarsen circle, and that the Friar's Heel is another 100 feet off. No doubt these distances are intentional, and correspond to the 100 feet diameter of the sarsen circle.

The Aubrey Holes

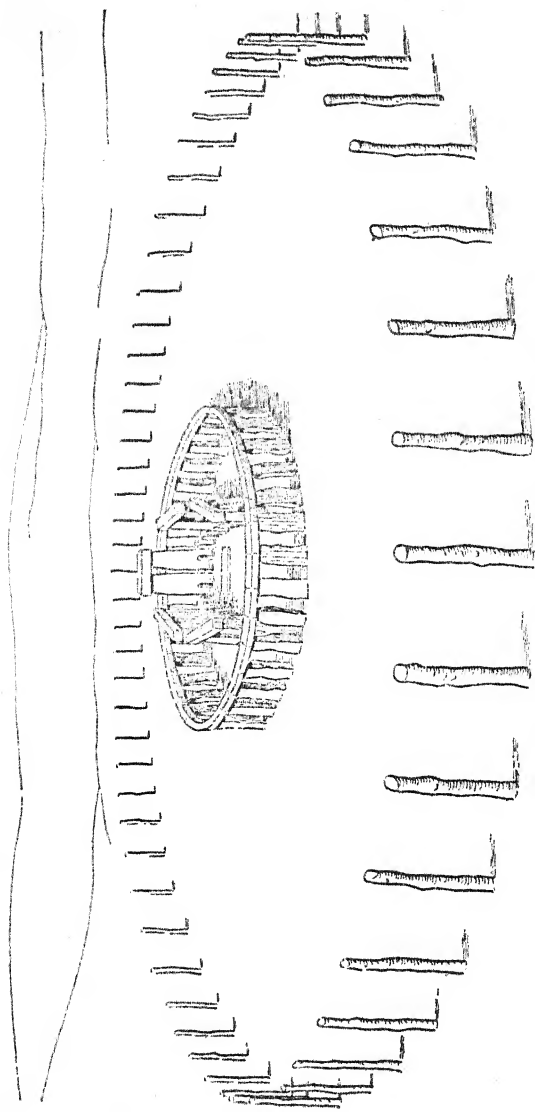
The discovery of these holes is one of the romances of Stonehenge exploration. Aubrey in the seventeenth century noticed and showed on his plan a number of slight cavities or depressions within the inner edge of the bank, and suggested that they may have held a circle of stones like those at Avebury. His discovery was forgotten, or discredited, and a century and a half later when Colt Hoare was at work, the depressions are no longer mentioned and had apparently disappeared: certainly when the excavations of 1919 were started no trace of them was visible, even after the position of each was known. Acting on Aubrey's plan, the sites were excavated, and the acuteness of his observation was verified by in every case revealing a hole. The discovery was followed up by the search for more, and they were found to belong to a complete ring of holes, which are now marked with white discs of chalk on the ground; and in memory of the famous antiquary they have been named the Aubrey holes.

The holes lie on the circumference of a circle 288 feet in diameter whose centre is about $2\frac{1}{2}$ feet south of the centre of the monument. They are spaced with much accuracy at an interval centre to centre of 16 feet; and if, as seems pretty certain, this interval was continued all the way round, there would be 56 of them (see note at the end of the chapter).

In plan the holes are roughly circular, and they vary in size from a diameter of 30 inches and depth of 24, to a diameter of 60 inches and depth of 41. Most of the 32 excavated contained the remains of a human cremation, not in a compact mass, but usually diffused downwards from near the top to near the bottom; and the centre portion of the filling was usually more earthy than the edges, and contained late relics, such as Romano-British pottery, to a greater depth.

The shape of the holes, round instead of oblong, and the nature of the filling strongly suggest that the holes held wooden posts, now of course completely decayed; for the wood as it rotted would allow objects, originally near the surface, to slip down towards the centre, and so give rise to the characteristic funnel-shaped filling. Colonel Hawley, after seeing the post holes of Woodhenge, expressed this opinion in his latest report; it is confirmed by Mr. Newall who worked with him, and is now generally accepted by archaeologists.

Judging from the size of the holes, the posts must have been somewhere about 2 feet thick and 20 feet high. The illustration shows what they may be supposed to have looked like, as a surround to the stones. (In this and in those of the midsummer



8. Posts and Stones—Conjectured Restoration

sunrise in Chapter IV the stones of the blue stone circle are omitted for the reasons given on p. 120.)

Most of the holes have a slight ramp or incline on one side, which descends for part of the way down the hole, and was doubtless used, like those at Woodhenge, for inserting the posts. The cremations seem generally to have been placed in a shallow scoop in the upper part of the ramp, and to have slipped down from there as the post decayed. They were probably dedicatory, rather than sepulchral, for the bones were not always sufficient for a complete body, and no relics were found with them.

The Z and Y Holes

This system of holes (which are not marked on the ground) was an unexpected find, made when clearing the surface soil off the site. They are arranged in two concentric rings which have been explored over rather more than half the area; and soundings on the turf prove that, like the Aubrey holes, they continue all the way round.

The holes are placed directly behind each of the stones of the sarsen circle, so there were 30 to each ring; and they must be later in date, for one of them has been dug right through the incline used for the erection of the sarsen. This fact may partly explain why the plan is as irregular as it is, for after the sarsens were up it would have been impossible to use a picketed cord to mark out a true circle; but even so one would have expected the builders to have measured back the same distance from the sarsen circle for each hole, and this would have given a much truer circle than the one we find.

One hole, Z8, is apparently missing, and another, Y7, is only partly dug. With these exceptions the holes are about 2 to $2\frac{1}{2}$ feet long and $1\frac{1}{2}$ to 2 feet wide at the bottom, and 3 feet deep. They are evidently stone, not wood-post, holes from their rectangular shape; but they can never have been used. No sign was found of the bruised chalk or broken-down sides that one would expect if stones had been extracted from them, and in one hole three entire antlers were lying at the bottom. In size and number they would fit the blue stones of the circle, and it is an interesting point whether they were intended for them; but the consideration of this, and why there is no Z8, and what was found in the holes must be left for the discussion on Stonehenge date, in which they play an important part.

The Four Stations

The name has been given to the two very low mounds and the two corresponding small sarsen stones (Nos. 91 and 93) that lie just inside Stonehenge bank. Insignificant as they are in appearance, these are rivalled only by the Z and Y holes among the puzzles of Stonehenge, and a completely satisfactory explanation is still to seek. That given by the official guide issued by His Majesty's Stationery Office is certainly wrong: the stones do not mark the rising of the sun at the winter solstice or its setting at the summer. Norman Lockyer observed that the stones would indicate sunset and sunrise on May 6 and November 8 (also incidentally on February 2 and August 5), and supposed them to have been set up to give the dates for a May–November year; but the view across is completely

hidden by the rest of the monument, and they could have served this purpose only if they were earlier in date.

Whatever explanation is offered the mounds must be considered as well as the stones. It used to be thought that they were barrows, and Colt Hoare found a 'simple interment of burnt bones' in the northern one. Colonel Hawley's excavations however have cleared this up: he found that the southern mound owes its appearance to a shallow circular ditch which surrounded the hole where a stone once stood; and that the position of the hole corresponds precisely with the existing stones 91 and 93. Colt Hoare remarks that the northern mound had also a circular ditch, and we may feel sure that it too conceals the site of a lost stone. The Four Stations therefore are really four stones. Each so-called mound covers the site of at least two Aubrey holes, as well as the stone hole; and Colt Hoare's simple interment of burnt bones was doubtless the usual cremation of an Aubrey hole into which he had unwittingly dug.

The next question is why four stones were set up in these positions, and there seem to be two possible answers. Flinders Petrie pointed out (1) that the line joining 92 and 94 intersects that joining 91 and 93 at the centre of the monument: (2) that the angle formed by these lines is exactly half a right angle, and that it is bisected by a line at right angles to the axis. In other words the stones are symmetrical with the axis, and the lines joining them meet at 45 degrees: perhaps the intention was to indicate the division of a circle into 16 equal parts.

This may however be a false clue and the half right angle only a coincidence. Another way of looking at it is:

That the lines 91-4 and 92-3 are tangents to the sarsen circle, the four stones being just completely visible, one from the other, on looking across. In other words 91, 92, 93, and 94 may have been designed to make a rectangle symmetrical with the axis and enclosing the stones of the monument. The diagonals of such a rectangle must necessarily meet at the centre, but the angle at which they meet, half a right angle, would be a coincidence and therefore have no significance.

Which of the two constructions is likely to have been intended has some bearing on their date, and in that connexion will be discussed later (see p. 77). Norman Lockyer, besides his May and November orientations, suggested that 91-2 and 93-4 are purposely parallel with the axis in order to serve as observing points for the rising sun at midsummer; and although this may seem a little far fetched, it is not unlikely.

The principal axis through the entrance and central trilithon (described in the fourth chapter) allows but little room for spectators, and the public, denied admission to this superior position, may quite reasonably have been given the means of enjoying a similar spectacle from outside the Stonehenge enclosure. They would see the sun rising over stones instead of between them; but this is the usual arrangement in megalithic structures that are oriented. Judging from the southern pair, we can say that the Aubrey posts (even if they were standing at the time) would not have hidden the view.

Post Holes

Besides the Aubrey circle, Colonel Hawley found a large number of much smaller round holes, evidently intended for posts, but not arranged in circles. There are two principal clusters of these, one in the main causeway of the ditch, and one extending in a broad irregular belt from in front of the southern causeway, which was also an old trackway, to as far as stone No. 8. There are some 50 or 60 holes in the first and more in the second; and others were found at the mouth of the horseshoe and a few near the Friar's Heel. They average about a foot in diameter, but are very variable both in size and depth. On the causeway they seem to be grouped more or less in parallel lines, but without much regularity, and elsewhere they make no sort of pattern. Nothing but chalk has been found in them, and Colonel Hawley supposed them to be earlier than the stones; they were not contemporary, for post holes have been found at the bottom and sides of empty stone holes, but there seems no reason why they should not be later. It has been suggested that those on the causeway held posts to form some sort of barrier; but this explanation, which does not sound very likely, would not suit the others, and one would expect to find the same for all.

Stonehenge used to be the scene of annual fairs, and perhaps this is the clue: the greasy pole, or bear, tethered for baiting, would have needed a fresh hole every year; and something of the sort seems a more likely explanation than anything prehistoric.

NOTES

1. *The Spacing of the Stones and Aubrey Holes*

The difficulty of spacing stones at equal distances round a circle seems hardly to have been appreciated. Nowadays we could calculate the circumference from the diameter ($= \text{diameter} \times \pi$) and divide by the number of stones. It would give the length of the arcs, not the chords, so a slight adjustment would be needed if the stones were few and far apart, but practically nothing for such circles as these; or we might get an exact result by trigonometry. But in days when π and the science of trigonometry were unknown, and the process of division (supposing the circumference was measured) could be done, if at all, only by continued subtraction, the correct spacing would have been far from a simple matter.

The calculation was not of course beyond the capacity of the Greeks, and as will be seen from Part II there is evidence of Greek influence in the design of Stonehenge; but with the exercise of care and patience no mathematics are really necessary. The correct spacing could have been found by trial and error, a suitable distance apart being chosen and tried round the circle, and then altered again and again until it exactly fitted. If this method was used the interval chosen for the sarsen circle seems to have been intended to make the interspaces about half the solids, for the space between the stones averages about $3\frac{1}{2}$ feet, and the stones themselves about 7 feet. After much experimenting it would be found that 10 feet 2 inches goes round

the circle 30 times and leaves no remainder. Obviously such a method does not admit of choice in the number of stones, so no significance could be attached to the number 30.

How accurately the work was done can be tested on the ground, or on Petrie's very accurate plan given in his *Stonehenge, Plans, Descriptions, and Theories*, 1882. His scale is at 1 in 200, so 10 feet 2 inches is represented by $\cdot 61$ inch. Set a pair of compasses to $\cdot 61$ inch and straddle along the circumference from the centre of one stone to the next, and the compass-point will be found to come plumb in the middle of each stone. The only exceptions are the two entrance stones, Nos. 1 and 29, set 6 inches farther apart than the normal. Alter the distance to $\cdot 60$ or $\cdot 62$, that is to say one-hundredth of an inch, corresponding to 2 inches on the ground, and the compass-point will be found missing the centre by more and more after the first two or three stones are passed.

The accuracy is disguised by the very uneven width of the stones, but it shows not only most careful setting out, but equally careful placing afterwards, no light matter with these enormous stones; and we cannot help feeling that if it had been less exact nobody would have noticed it. Such a high standard of workmanship must be reckoned with in considering who may have been the builders and the probable date.

In the Aubrey circle the spacing of the holes is less perfect, but was certainly more difficult, for by the trial and error method a difference of only one inch in the length of the measuring rod would be repeated 56 times in going round the circle,

and give a difference of nearly 6 feet at the end. It can hardly be supposed that the measurement was repeated over and over again, with still more minute differences, until an interval was found absolutely to fit. Probably the circle was first halved by a diameter, then quartered, either by a geometrical construction or more likely by trial and error, and then perhaps divided again to make eight equal arcs. It would be a comparatively simple matter to find that an interval of 16 feet would fit one of these arcs and give seven divisions; and once found the interval could be used all round the circle. Whatever method was used it may be safely considered original, for nothing to be compared with the accuracy in spacing is to be found elsewhere in England, except in the sarsen circle of Stonehenge itself. The point is important for it shows that they are not likely to have been made at different times, and this aspect will be discussed in Chapter V.

2. *Post Holes in Chalk*

It is sometimes asked how an excavator can tell whether he is clearing out an old hole or digging himself a new one. In some soils it is very difficult; but on Salisbury Plain the solid chalk is never far below the surface, and if a hole has once been made in that, the filling will always be recognizably different from the surrounding chalk. Shallow holes in the top soil will of course be obliterated, but all those found by Colonel Hawley had penetrated into the solid, so that when the surface soil was removed the round patch of loose chalk or mould that filled the hole became instantly visible.

CHAPTER III

THE STONES AND THEIR ERECTION

AS already remarked, two very different kinds of stone were used at Stonehenge: the foreign blue stone and the more or less local sarsen. Besides these two there were a few smaller and softer stones, chiefly from the south Wiltshire neighbourhood of Chilmark, that have been used as packing stones inside the holes, but never above the surface.

The Sarsens

All the biggest stones of the monument are sarsens and native to Wiltshire; but this does not necessarily mean that they were found near Stonehenge, and it is much more likely that they were brought from a distance. On Salisbury Plain itself the sarsen boulders are so few and scattered as to suggest that they came there only through human agency, while in North Wilts, in the Marlborough district, there are areas where they lie so thick on the ground as to resemble huge flocks of sheep, hence their local name of greywethers. Many have been broken up in recent years for paving-stones; and to prevent complete destruction of this formation, so interesting geologically as well as historically, two areas in Piggle Dene Bottom, and Lockeridge

Dene Bottom, have recently been purchased and vested in the National Trust.

It has been objected that these greywether valleys cannot have been the source of the Stonehenge sarsen because the boulders there are seldom tabular in shape, but take the form of irregular masses that would have been unsuitable for Stonehenge, and moreover are much too small: none there now can be compared in size with those that have been used for the Stonehenge uprights. The objection sounds more plausible than it is, for tabular sarsens of a huge size, as big or bigger than the Stonehenge stones, have been used at Avebury in North Wilts, so evidently they were once available in the district, though good specimens were probably very local in occurrence.

That sarsen was very much more common in the north than south of the county goes without dispute: any one who examines the old farms and churches will find abundant use of sarsen for walls and gateposts in the north and an almost complete absence in the south. Geologically there seems little reason why this should be so,¹ and some writers have supposed that there may once have been a sarsen area near Stonehenge, but of such a small size that the stones were either all used there, or so quickly and completely broken up and dispersed as to leave no trace. This however would

¹ A possible explanation may be found in a recent theory that has not yet been verified. It is supposed from deposits in the far east and far west of England that a sea, corresponding to the English Channel, may have submerged, in Pliocene times, a large part of southern England, including Salisbury Plain; and the presence of this sea may account for the absence of the sarsens.

mean that practically the whole formation consisted of tabular sarsens of suitable dimensions, and it does not seem very likely that one area and one area only should be found in South Wilts, and that it so exactly fitted Stonehenge requirements. As a further argument against a strictly local source there is the evidence at Stonehenge itself; for if a local supply existed, it would have been used for the smaller odds and ends of stone needed for packing-blocks, and the builders would not have troubled to fetch stone from Chilmark. Why stones should have been carried to a distance and not used locally, as they were at Avebury, is one of the mysteries of Stonehenge. It is suggestive that Woodhenge is only two miles away, and was made of wood and therefore cannot have lasted very long: Stonehenge has many features in common, and may very well have been a replacement in a superior and more permanent form (see p. 94).

The presence of the hard sarsen stones strewn over the native chalk seems a very mysterious matter, and one explanation of the word is that it was originally 'saracen stones', signifying something foreign and not altogether canny. Stukeley, as a learned man, gives a geological explanation that is so curious as to be worth quoting:

As this chalky matter harden'd at creation, it spew'd out the most solid body of the stones, of greater specific gravity than itself; and assisted by the centrifuge power, owing to the rotation of the globe upon its axis, threw them upon the surface, where they now lie.

We now know that they are a tertiary rock formed by cementing together the sands and gravels of

the Eocene period which lay over the chalk. The varying thickness of the beds and completeness of cementation account for the different kinds of boulders met with, the degree of hardness, and also for the cavities in the stones, where the uncemented material has weathered clean away. The comparatively flat boulders, called tabular sarsens, which have formed into many-sided slabs, rather like cakes of drying mud, are probably the result of the whole of a shallow bed becoming solidified. They were much the most sought after, and, except the Friar's Heel, all the boulders chosen for Stonehenge have been of this type; they vary in thickness, as do the stones as erected, and they have been so placed as to get full advantage of their flat surfaces without the need of cutting or trimming.

The Blue Stones

It has been recognized for many years that the so-called blue stones (they are now so weathered that only a new fracture looks blue) of the inner circle and inner horseshoe are igneous in origin and foreign to Wiltshire. Many arguments have been given and much ink wasted in finding a source for them: Cumberland, Devonshire, Cornwall, Wales, and even Brittany and Ireland have been suggested, or they have been left homeless as glacier-borne erratics. But at last a site has been found in the Prescelly Mountains of Pembrokeshire where all the varieties of Stonehenge blue stone can be exactly matched by the native boulders (*Antiquaries' Journal*, Vol. III, pp. 239-60).

There can be no doubt now from whence they came; but why, how, or when remains a mystery.

The land route is 180 miles, and even if they were ferried across the Bristol Channel, the distance would not be very much less; almost inevitably we look for some religious motive to account for such a difficult and toilsome undertaking. The Prescelly district has many rude circles of similar stones, and we may imagine that one was specially sacred and was moved by a migrating people; or perhaps a chieftain of that district died in Wiltshire, and the stones of his native land were brought for the burial; or perhaps they commemorate a tribal victory long since forgotten.

The people who brought them seem to have lived in the Long Barrow period, nearly 4,000 years ago, but we cannot be sure that the stones were first used in Wiltshire at Stonehenge. The subject will be discussed in Part II, and it is enough to say here that blue stone fragments have been found elsewhere in the county, and at burial sites.

They were almost certainly moved as rough uncut boulders and dressed at Stonehenge, for the sub-soil there is plentifully strewn with their chippings. The largest is the Altar stone weighing 7 tons; it is not geologically a blue stone, but it is another foreigner and is likely to have come from the same neighbourhood.

Shaping

Since sarsen occurs in the form of boulders no excavation was needed, but they would have to be shaped to get the rectangular blocks found at Stonehenge. It is too hard to cut, but can be split readily in either of two directions, and without this quality the building of Stonehenge as we know it would

have been impossible. The cleavage is most easily made and gives the most even surface when the direction is parallel to the bedding plane, that is generally parallel to the surface on which they lie; but sarsen will also split with fair accuracy at right angles to the bed; in any other direction the fracture is rough and irregular. To break up the stones the modern stone-breaker drills holes in a line (like those visible on the Slaughter stone), and splits the stone with wedges. Fair accuracy however can be obtained with much more primitive methods and without the use of steel tools; and Aubrey has described them in his account of the destruction of Avebury in the seventeenth century:

I have heard the minister of Aubury say those huge stones may be broken in what part of them you please without any great trouble. The manner is thus: they make a fire on that line of the stone where they would have it crack; and, after the stone is well heated, draw over a line with cold water, and immediately give a smart knock with a smyth's sledge, and it will breake like the collets at the glassehouse (*Natural History of Wiltshire*).

The method was still in use and the destruction of Avebury still going on nearly 100 years later, and Stukeley describes it with greater detail in his *Avebury a Temple of the British Druids*, dated 1743:

The method is to dig a pit by the side of the stone, till it falls down, then to burn many loads of straw under it. They draw lines of water along it when heated, and then with smart strokes of a great sledge-hammer, its prodigious bulk is divided into many lesser parts. But this Atto de fe commonly costs thirty shillings in fire and labour, sometimes twice as much. They own too 'tis excessive hard work; for these stones are often 18 foot long, 13 broad, and 6 foot

thick; that their weight crushes the stones in pieces which they lay under them to make them lie hollow for burning; and for this purpose they raise them with timbers 20 foot long, and more, by the help of twenty men; but often the timbers were rent in pieces.

The charcoal remains of fires used to break up the smaller stones of The Sanctuary near Avebury—which Stukeley laments for the sake of 'the little dirty profit'—have in recent years been found on the spot where the destruction was done.

Mr. Stone in his *Stonehenge* has described how granite lying in layers is broken up by the native workmen in India:

A number of men stand in a line across the layer in the direction in which the slab is to be split. Each man has a maul which he holds between his two hands above his head. At a given signal from the foreman each man dashes down his maul simultaneously on the granite layer, which is thereby split across with a fairly even fracture. The pieces thus obtained are long blocks similar in size and shape to the sarsen stones of the outer circle at Stonehenge.

The method he describes might answer with sarsen and give more assurance of an even fracture than that used by the villagers of Avebury; and possibly the builders of Stonehenge knew of both.

The property of splitting explains why it was possible to get such shaped stones as the rectangular lintels, and why it is that some surfaces have a much truer and more even face than others. The naturally flat faces of the uprights are placed on the circumference of the circle or horseshoe, but their sides must have been split off and are therefore often less regular, the degree depending on the skill of the workers.

Trimming

Both sarsens and blue stones are so hard that chisels, unless made from the best hardened steel, would be useless for working on them. Whatever method of trimming was employed would therefore be the same if the builders had the use only of stone tools, or of bronze, or even iron as well; and, as far as the shaping of the stones is concerned, they may have lived in the Neolithic, Bronze, or Early Iron Age.

Mr. Stone has carried out some valuable experiments in working sarsen, and what follows is taken chiefly from his description of them in *Stonehenge*.

The process of splitting the boulders into blocks, which has already been described, doubtless took place on the site where the stones were found, thereby saving useless weight in haulage; and this is confirmed by the comparative scarcity of large pieces of sarsen at Stonehenge itself. The blocks would require a good deal of subsequent trimming, and this must have been done at Stonehenge.

At first the larger protuberances would be taken off by the use of heavy stone mauls, a number of which were found in the Stonehenge excavations. They are roughly globular lumps of quartzite, such as occur naturally in the sarsen formation, about the size of a man's head or even larger, and weighing 50 pounds or more. Six of them are in the Devizes Museum, and show evident signs of bruising all over the surface. The heaviest mauls were probably wielded by one man using both hands, but it is possible they may have been slung on ropes, or mounted in some sort of a handle to give greater impetus to the blow.

The smaller hammers of flint or quartzite, from 2 to 5 inches in diameter, would be held in one hand, and used for the lesser irregularities. Both light and heavy were probably used for the subsequent trimming of the stones to an even face, to obtain which the whole surface must have been pounded or pulverized so as to reduce it to dust. Mr. Stone's experiments show that the process is not so slow as one might imagine: he found that an inch in thickness over a square foot of surface may be taken off in 24 hours; and probably the rate could be increased by working the stone into parallel grooves, and then breaking down the ridges between them by blows directed sideways.

The surface left after pounding has a peculiar pitting or pock-marking; it is not often visible because the exposed face of the stone has weathered so much since, but a good specimen may be seen in the Devizes Museum, a flake broken off stone No. 56 from well below ground level; and at Stonehenge, on the undersides of stones 55*a* and the fallen lintel 122. (On Petrie's system the lintels are given numbers 100 higher than the uprights on which they rest.)

Still finer work is possible by grinding, that is to say working over the surface with a flat stone, used in conjunction with sand or crushed flint and water. Mr. Stone found that grinding was slower than pounding, the ratio being about 3 to 4; and it is not likely to have been used at Stonehenge except for the stones of the blue stone horseshoe. He also found that chipping with a flint tool on sarsen was practically useless: the stone is too hard, and even the modern mason when building with it,

splits the stone to shape and does not try to dress the surface with a chisel.

The blue stones will flake more readily than sarsen, and were probably dressed by hammer blows, chipping off pieces, as if they were enormous flint implements. The finish is more likely to have been by grinding than pounding.

Only the blue stones of the horseshoe have been much worked, those of the circle are almost if not quite in their natural condition. In spite of this far more blue stone than sarsen chips have been found in the excavations: they were counted in selected areas with the following results: blue stone 2,061, sarsen 398; blue stone 3,911, sarsen 864; and in the small space of 50 square feet there were 700 and 85 respectively. This would be partly due to the different method of dressing the stones, since the pounding of sarsen would leave no trace of what had been taken off, and it chips so much less easily; but evidently the sarsens arrived on the spot already more or less to shape, while all the work done on the blue stones must have been after their arrival.

Transportation

The distance of the nearest sarsen formations, Lockeridge Dene and Clatford Bottom, is from 16 to 18 miles as the crow flies, and there is at least an Avon tributary, if not also the Kennet river, to cross. If however it was possible to move the stones a few hundred yards it was equally possible for twenty miles—if the need was felt. The only difference is that longer time and more organization would be wanted, and the building of Stonehenge

cannot have lacked either. A similar feat, over less distance, had almost certainly been already accomplished at Avebury, and in France a dolmen capstone has been mounted that must have weighed nearly double the largest stone in either of these monuments.

We have pictures to show how huge monoliths, far heavier than the European, were moved in Assyria and Egypt: they were mounted on sledges and dragged by brute, or rather slave, force.¹ The smaller sarsen and all the blue stones could have been moved in this way; but for very heavy weights a substantial stone road would be needed for the sledge, and probably all the big sarsens were moved on rollers. It is of course a slower process, as each roller in turn gets left behind as the stone progresses, and a fresh one has to take its place in front; but as an engineering feat it presents no real difficulty, and the method was doubtless known long before Stonehenge was thought of. Such an uncouth mass as the Friar's Heel would probably be mounted on some sort of timber framework or cradle, so that the surface bearing on the rollers should be smooth wood instead of irregular stone; but for the majority of the tabular sarsens no special contrivance would be needed, and if large and smooth tree trunks were used for the rollers, the rate of progress might well have averaged half a mile a day. Over most of Salisbury Plain the going on the hard smooth turf would be good enough during the summer without any special trackway; but in the marshy ground of the river valleys a causeway of timbers laid along

¹ Modern instances are described in *Antiquity*, September and December, 1928, and September, 1929.

the path of the rollers would be wanted; and since wood in soil continuously wet does not rot they are probably still there and may one day be discovered.

Some people have supposed that the stones were carried by water and have imagined Amesbury as the port for Stonehenge. This is possible for such small stones as the blue stones, but entirely out of the question for any of the sarsen uprights.

Erection

The method of erecting the stones is interesting, as it shows the great care taken to have them exactly right. The easiest, but not the most accurate way, would be that used by Mr. Stone with his models and described in his *Stonehenge*. He supposed the holes for the stones were cut with an incline on the outside and a vertical face on the inside, and that the stone was tipped off its roller down the incline and then pulled upright against the vertical face. The objection to this kind of hole is that there is no room for subsequent adjustment if the stone proved to be not quite in its right place, and evidently it was not considered good enough for the stones of the sarsen circle.

Instead of small holes made to fit the stones, Colonel Hawley found that they were considerably larger on all four sides, and that the stones were held in position in them by packing blocks of stone—quite often the mauls that had been used to dress them. As an exception the hole for No. 12 seems to have been a fairly tight fit, and only small packing blocks were used, and those only at the higher levels. In all the others examined, Nos. 29, 30, 1, 6, 7, 8, and 13, the holes are large and without a vertical

face for the stones to butt against. Two of them, Nos. 1 and 29, have no inclines, but these two are large enough, with the rather thin stones used, to make an incline unnecessary.

Colonel Hawley also discovered definite traces of the means used to secure an exact adjustment in the holes. At the bottom of all of them, except No. 12 and one other, No. 6, he found holes sunk in the chalk in a line with the face of the stone. There might be 4 or 5 of these, either small scoops in the chalk, or real holes about 6 inches in diameter and sunk a foot or more into the floor; sometimes they ran all across the bottom, but generally they were grouped at one end only. The larger ones were evidently for wooden posts, and they must have been made after the stone was put in and pulled upright, for in one case the holes are on the *outside* of the stone, just at the foot of the incline. They were never both at the outside and inside faces of the same stone.

The meaning of these holes will become clear if we study the sequence of operations. After the stone is tipped off its roller into the hole, a good deal of the weight would still be on the roller against which it is leaning, so it would be possible to prise it right or left in order to get the centre of the stone into its correct position, if not already there. After the stone was once upright, it would be far too heavy to move lengthwise in either of these directions.

The next operation would be to pull the stone upright, and by measurement see if the face was truly on the circle. It would be extremely difficult to be sure of this before tipping in the stone, and in every hole examined by Colonel Hawley, except

Nos. 12 and 6, some subsequent adjustment was evidently needed.

These enormous blocks could not be prised forwards or backwards when standing upright in their holes (steadied of course by ropes); but one corner at a time might be moved with comparative ease. In doing so however the stone, in the smooth chalk, would tend to pivot on its centre, bringing the other corner forward; and this, I think, is what the posts were intended to prevent. The smaller holes or scoops were probably for the points of the levers used to move the stones, and the larger for fixed posts driven in and wedged tight as soon as one end of the stone was in the correct alignment. The operation has apparently squeezed them so tight as to make it impossible to withdraw them all, for traces of decayed wood were still to be found in many of the holes.

The probable method of pulling the stones upright is described very convincingly in *Stonehenge*. Mr. Stone supposes that a pair of sheer legs was set up on the inside, and fastened to the stone and to the hauling ropes. This would make the work as light as is possible without blocks and tackle, but even so 180 men would be needed to pull upright the stones of the circle, and twice as many for the tallest trilithons, but probably some extra help was given by levers.

The ramps or inclines for the sarsen circle are on the outer side, but those for the trilithons, judging from Professor Gowland's excavation round No. 56, are on the inner. This proves that the blue stone horseshoe is later in order of erection, and suggests that the sarsen circle stones are earlier. Ramps

pointing away from where the stones must come are not what one would expect, but are explicable if the circle stones were already up, because the space between the two gives no room. For the circle to be first is also the natural order, for only so would there be a clear space to use a picketed cord.

The erection of the lintels looks a most formidable business, but the chief difficulty was probably in fitting them rather than in getting them up. They could have been lifted by levers and packed up on cribs of timber, but are more likely to have been raised by sliding or rolling them up on inclined planes; and these were probably of earth or chalk completely surrounding the uprights so as not to bring the pressure all on one side. Mr. Stone, supposing they were parbuckled with ropes and bollards, calculates that 100 men would be needed for each of the circle lintels; or with flatter inclines, the bollards could have been dispensed with. Once over the uprights, the lintel could be held poised above them by levers, and allowed to drop into position after the final dressing of the stones was completed.

CHAPTER IV

ORIENTATION

The Axis of Stonehenge

THAT Stonehenge was intentionally aligned on the rising sun at midsummer seems generally to be agreed, although there are archaeologists who consider a precise alignment was never intended, and that the monument was meant to point only roughly north-east. The question is important, as on it very largely depends whether Stonehenge is likely to have been sepulchral in origin—for which an exact orientation seems absurd—or whether it was some sort of temple, connected probably with sun worship.

The opinion that the orientation was intentional has been very much strengthened lately by the discovery of Woodhenge, with a similar axial alignment and similar dimensions for its principal parts; but apart from this (which must be discussed later) there is at Stonehenge itself very strong, if not overwhelming evidence of an exact alignment. It has so impressed some observers that from it they have hoped to date the monument; but before explaining how this might be possible, the evidence itself must be examined closely.

The general arrangement of the horseshoe stones opening towards the ditch causeway and Avenue, with the Slaughter stone and Heel stone in line,

indicates, though it does not define, a central line round which Stonehenge has been built. This central line is called the axis, and its precise definition depends on the Avenue, extending beyond the Heel stone, and on the arrangement of stones in the monument.

The Avenue

Many visitors to Stonehenge overlook this interesting and important feature altogether. The stones themselves are so impressive that the short piece of Avenue bank and ditch between them and the road is disregarded, and they have no eyes for the plain stretching in the opposite direction towards Larkhill, where the line of the Avenue is most clearly marked. Cross the road however and turn your back on the Friar's Heel and Slaughter stone, and you will see two low banks and ditches leading away in a north-easterly direction, and between them a slightly raised level road of turf. It continues straight for nearly 600 yards until it reaches the bottom of the valley, and then divides or turns: one branch is said to go to the left and join up with the Cursus, but this has never been verified; the other turns upwards to the right and makes towards Amesbury, but only in certain lights is it visible through the cultivated fields (though it has been seen clearly by air photography), and its actual termination, or rather its starting-point, has never been discovered.

The ditches are 71 feet apart and the banks 47, and excavation has shown that the ditches were V-shaped and about 3 feet deep. It is likely that the ditches were intended chiefly to supply chalk for

the banks, the clear white lines of which would make an effective edging to the road, especially in the early morning light.

We cannot be certain for what purpose the Avenue was designed; but the suggestion that it is the path by which the stones were brought to Stonehenge seems, to say the least, inadequate. What we have to explain is why it takes a roundabout way from near Amesbury, and then for 600 yards heads straight for the centre of the monument, and for that distance follows precisely the path of the sun's rays on midsummer morning. It is difficult to escape the conclusion that it was some sort of processional path, and that its direction was intentional.

As it approaches Stonehenge ditch, the bank and ditch of the Avenue become rapidly shallower and cease altogether when within 10 feet of it. The centre line if continued into the circle will be found to pass centrally (or almost centrally) through the entrance, through the centre of the sarsen circle, and between the uprights of the great central trilithon.

The Stones

It is quite obvious from the general arrangement of the stones that a central line or axis must have been laid out before the construction started. The two entrance stones, 30 and 1, on each side of the axis are deliberately placed 12 inches farther apart than the rest, and their inner faces have been carefully trimmed so as to be at the same distance from it all the way up. The sarsen circle has been drawn with its centre on the axis. The blue stone horseshoe has its central stone on the axis and the stones

on each side are set farther apart than the rest. And lastly the great central trilithon is astride of it, and the inner faces of the stones which make the opening are trimmed with exceptional care.

The stones and Avenue are enough to prove beyond reasonable doubt that the monument is intentionally aligned on the midsummer sunrise, and most archaeologists are content to stop at that; but it is possible to go a good deal further, though on much less certain ground. There is at least a possibility that the alignment was made very accurately, and if so, and if we could say exactly what it was, it might be possible to date the monument astronomically. There was a practical object that such an alignment could serve, and it is not always realized how important this may have been.

Correcting the Calendar

Sunrise of course is seen at a different place along the horizon throughout the year: it is farthest south in the middle of winter, due east at the equinox, and reaches its farthest north, nearly north-east, at midsummer; so a knowledge of its position would give the date on any day during the year; but only certain positions are likely to have been chosen.

The movement from day to day is greatest at the equinoxes and least at the summer and winter solstices, and for this reason, an equinox observation of sunrise gives the date more accurately than one at the solstices. But the equinox has no special significance (especially when there were no clocks to prove the day equal to the night), while the summer solstice is very strikingly marked by the sun's maximum travel towards the north and its pause

at one spot before returning, so it is not surprising to find that the solstice and not the equinox has been commonly chosen to fix the date. A very accurate alignment must be made to distinguish the date, because the sun rises at almost the same spot for several days in succession; but why a date should be wanted at all is perhaps not so clear.

The explanation sometimes given, that it tells the farmer when to sow and when to reap, is very unsatisfying: if he needed such guidance he certainly would not require an elaborate monument like Stonehenge for the purpose; any pair of stones sufficiently far apart and directed on the sunrise would serve the purpose as well or better, and be infinitely easier to set up. But Stonehenge was not a mere farmer's guide to agriculture; and if it was used for dating purposes at all, it was probably to correct the calendar, though of course this was not its only function, any more than Westminster Abbey is used only for the coronation of kings.

Our own calendar is so simple, compared with calendars of the past, that it is hard to realize what a complicated and imperfect measure it used to be. The lunar month was always the primitive unit of time, and the trouble has been to reconcile it with the solar year. There are 29.53 days to the lunar month and 365.24 to the year, and even if the fractions were ignored, 12 months would be too few and 13 too many to complete the year. A perfect reconciliation is impossible, and the reformed calendar of Julius Caesar dropped the lunar month and invented months of an artificial length instead. Before his time the usual device was to insert an occasional extra month; and the Greeks kept an

almost perfect reckoning by inserting three every eight years.

Other time schemes were less accurate, and needed special interventions at irregular periods. A bronze calendar discovered at Coligny in France is a good illustration of how the thing might be done: it has a year of 355 days reckoned in lunar months of 29 or 30 days, and the loss of 10 days in the year is balanced by inserting an extra month of 30 days once every $2\frac{1}{2}$ years. This gives a total of 1,835 days in 5 years, which is 9 more than there should be; in spite of its automatic correction therefore, the calendar would still be working wrong, but at an unknown rate, so that every now and then some special action would be needed to make the seasons agree with it. As with the Jews, and Romans at the time of the Republic, this was probably a priestly duty, and the high-priest (or arch-druid), whose business it might be, would doubtless find the prestige of such a monument as Stonehenge, with a correct dating of the summer solstice, an invaluable ally. Even in the eighteenth century the people of this country did not take kindly to the loss of 11 days, and apart from superstition, all sorts of complications are likely to arise. In Rome, for instance, the regulation gave so much trouble and led to such bribery and corruption that for a long time the calendar remained uncorrected, so that when at last Caesar stepped in, 90 extra days were wanted to make it fit the seasons.

If Stonehenge and the summer solstice were used for the purpose it would not be without precedent, for stones were set up with this object by the Incas of Peru, and by the Scandinavians, who used them

into mediaeval times; and the Greek calendar was corrected by the summer solstice as long ago as 800 B.C.

The need would not have been felt by a very primitive society, and if Stonehenge was used for the purpose, it suggests a later date than is usually supposed.

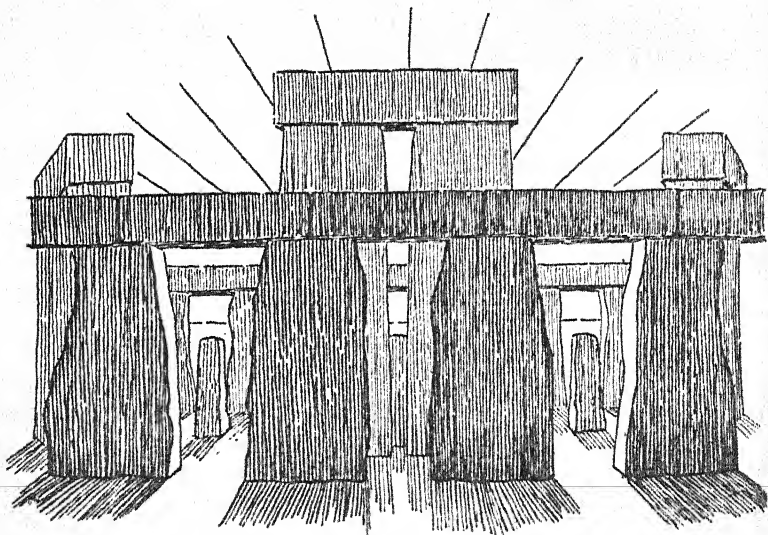
We must now return to the detailed arrangement of the stones and find out if possible what was the direction of the midsummer sun when it rose in the days when Stonehenge was built, and what means seem to have been adopted to align on it.

Direction of the Axis

It has been commonly supposed that the observer stood behind the central trilithon, so as to see the entrance stones through the trilithon opening; but for any position from which both pairs of stones are visible, the horizon must have been hidden by the central stone of the blue stone horseshoe. The stone has fallen, but it is 12 feet long, and the usual depth to sink the blue stones is only 3 to 4 feet (the nearest, No. 58, is sunk 5 feet, but this is exceptional and probably due to the foundations being in the loose rubble filling of stone 56, instead of in solid chalk), so that probably, like its neighbour, 8 feet was exposed, and 8 feet, or even 7, is certainly too high to see over. He might have stood on a platform, but it would have been much simpler to have made the blue stone a little lower or even omit it altogether, and a position needing such an artificial contrivance must be looked at with grave suspicion.

A much more likely position is from the surround-

ing bank (see illustration), from which there would be no difficulty in seeing over the blue stone; but from there the entrance stones would be hidden by the uprights of the trilithon and only part of their lintel visible. A close observation of the sunrise could however have been obtained by using a rod with a marked centre fixed across the entrance



9. Midsummer Sunrise from the Bank

opening to serve as a forward observing point. The trilithon opening is wide enough to watch for the sunrise, yet narrow enough to ensure getting the forward observing point exactly central, and the arrangement would act like a very efficient natural telescope.

We must recognize that such an arrangement

does not make it necessary for the entrance stones to be exactly at equal distances from the axis, for the rod used need not have been marked at its central point: we can only assume that they would be from the generally accurate lay-out of the rest of the monument, and the ease with which fine adjustments could be made after the stones were up by trimming the surface.

The stones are admirably adapted for observing the midsummer sunrise, and the phenomena of sunrise remaining stationary at the same place for several days needs for observation a very accurate alignment; and yet owing to the ruined state of the monument, there must be a good deal of uncertainty now about the exact direction. We cannot of course say where on the bank the observer stood, nor the exact width of the central trilithon opening; but the direction can be obtained approximately by aligning the centre of the circle on the centre of the entrance. The line, which may be called the central axis, is fixed by points only 50 feet apart, and one of them, the circle centre, is not marked by a stone, and cannot be known precisely; so absolute accuracy must not be expected from it.

Obviously a longer line, like sights far apart on a rifle, would be a more efficient pointer. Petrie tried to lengthen it by estimating the width of the trilithon opening, and therefore the central point between them through which the axis must pass: the stones of the two standing trilithons are each about 13 inches apart, and the fallen stone, No. 55, which lies almost radially and cannot have shifted much, is also about 13 inches from its fellow. He concluded that the opening must have been about

14 inches, and made his axis pass centrally through it. The central axis produced would give an opening of 15 inches, so it differs very little from Petrie's; but neither can lay claim to any certainty.

Norman Lockyer, in his search for a longer line to determine the axis more accurately, made no use of the stones, except as a rough verification, and relied only on the Avenue. The Avenue however is not perfectly straight, and we cannot be sure that any great care was taken with its lay-out; it runs downhill and would therefore be useless for observing the sun, and it is probably merely a prolongation, not very exactly made, of the axis laid out for the stones, just as a chancel added to a nave is not always in the same line. The difference is very small, for Lockyer's centre line of the Avenue passes within $3\frac{1}{2}$ inches of the middle point between the entrance stones and through the centre of the circle; but it makes all the difference if an astronomical computation of the date is to be attempted. Stone, in his *Stonehenge*, has tried to reconcile them, but his axis misses the centre of the sarsen circle by several inches, and it is quite evident that the lines given by the stones and the Avenue do slightly diverge.

The Astronomical Dating

The reason for all these elaborate attempts to recover the direction of the axis is that the position of sunrise has varied, owing to the precession of the equinoxes, and if we could tell exactly where it was when Stonehenge was built, we should be able to estimate its date. But the variation is so little, only one degree in some 4,000 years, that a very accurate

determination is needed to be of any use, and we must of course know whether the first glimpse or the fully risen sun was aimed at.

This last difficulty need not be much considered, for anyone who has ever watched a sunrise cannot fail to appreciate that the impressive moment is when the first ray of light becomes visible, and this gives a much better definition than after the sun is fully risen. Incidentally the fully risen sun would make Stonehenge quite impossibly ancient. There is also the likelihood of the Friar's Heel having served as a pointer to the fully risen sun, so the axis, which must pass well to the left of it, cannot have done so also.

At least three attempts have been made to use the precession of the equinoxes for dating Stonehenge. The first was in the eighteenth century; its author found Stonehenge to be at least 15,000 years old, and incidentally demonstrated that it had been immersed in a sea twelve miles deep. The second, by Flinders Petrie (*Stonehenge, Plans, Descriptions and Theories*, 1882), came to grief over the astronomical calculations, which are very technical and difficult, and produced another impossible, though much less wild result. It was only after Norman Lockyer took it in hand that this side of the matter was properly dealt with, and his book for a time made a considerable sensation (*Stonehenge, and Other British Stone Monuments*, 1906). Unfortunately Norman Lockyer, who was an astronomer with little or no knowledge of archaeology, was not content with this achievement, but attempted by the same means to date prehistoric monuments of every description. He soon gave

up relying only on the sun, which could give only a few alignments, such as sunrise or sunset at the solstices and equinoxes, and fell back on the stars. There are plenty of these to choose from, and their position in the heavens has varied very much more in the course of time than that of the sun. Alignments were possible therefore in almost every direction; and Lockyer and his followers dated barrows, stone circles, and avenues with the greatest freedom. With plentiful stars and plenty of positions for them, the dating became too easy; like Gilbert's wonder-working king of old, he had found in point of fact too many.

Nowadays the whole subject of orientation has become distasteful to archaeologists; and this perhaps is why some prefer to think that Stonehenge had nothing to do with the midsummer sunrise, and that its orientation is a figment of the imagination. But if we need have no doubt about that, it does not follow that Stonehenge can be astronomically dated. The slow variation in the position of sunrise is the chief difficulty, for it means that for any useful dating the line of the axis must have been very carefully set out: the builders would not have done this to enable us to date Stonehenge, but they would have had to do so if they wanted to use it for correcting the calendar; so what may have served their purposes may also serve ours.

The difficulty of finding what the line was has been fully discussed, also why Lockyer's choice of the Avenue is not reliable.

Lockyer found the azimuth to be $49^{\circ} 34'$, which would correspond to a date of 1840 B.C. The central axis, using the stones only, has an azimuth

of $49^{\circ} 54'$ and corresponds to 400 B.C. (see note at the end of this chapter).

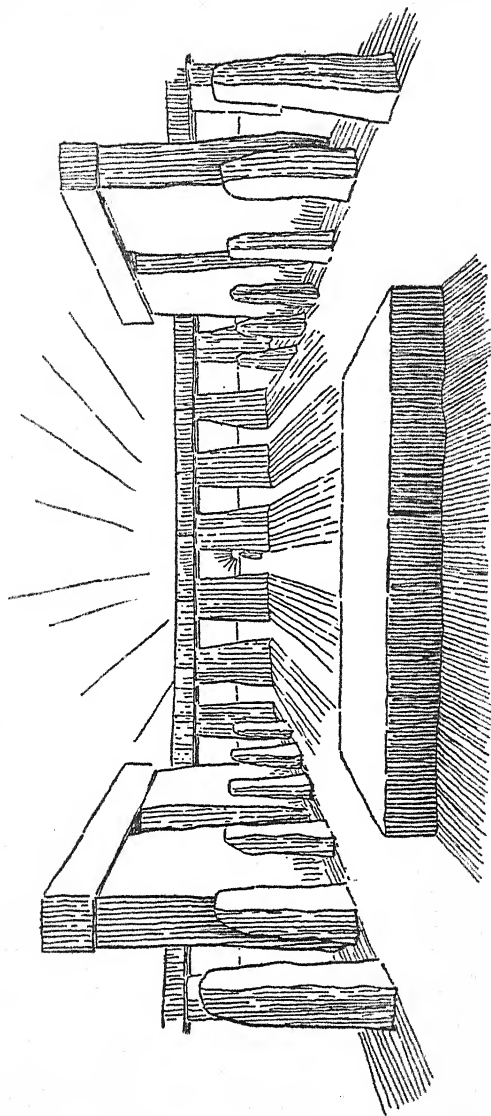
The central axis, as already remarked, cannot be known with certainty, and an error of an inch in the estimated position of the centre of the sarsen circle would make a difference of 6 minutes in the azimuth, or 400 years in the date.

Friar's Heel Alignment

There is another possibility of an astronomical dating, which may be more accurate, by using the Friar's Heel. This great stone with its peaked top, unlike any other in the monument, seems from its shape, position and perhaps its name (*vide* p. 22), to have been intended as a pointer; it cannot ever have been to midsummer sunrise, if by sunrise is meant the first glimpse of the sun; but it might, as Petrie suggested (*Man*, 1924, p. 78), have been used for the fully risen sun, that is to say the sun on the horizon. If it was, the important thing to decide is what was the observer's position, for the bearing of the stone would depend on how far on the axis he stood from it. It must obviously have been from where the peak of the Friar's Heel would appear just on the horizon, so that the sun when fully risen would make contact with it. If the ground were level there could be only one such position: moving forward from it would make the top project above, and moving back would make it sink below. As anyone may try by experiment, the position for a man of average height is a few feet behind the central trilithon; but from here the Friar's Heel and the horizon would certainly have

been hidden by the central blue stone of the horse-shoe. There is now a second position quite close to the Altar stone, but this is only because the ground there has been raised by a modern accumulation of soil and rubbish. The central blue stone now lies with the greater part of its upper surface at ground level; but when it fell its under surface must have been on the ground, and as the stone is 21 inches thick, nearly 2 feet of soil must have accumulated round it. The top of the Altar stone is also now practically at ground level, and it is also 21 inches thick and must be buried to the same depth (see note at the end of this chapter). It may be noticed incidentally that the Altar stone lying on the surface explains how it was possible for it to have moved when the trilithon stone fell on top of it. The stone has fallen almost radially with a slight skew to the left; it would have struck the edge of the Altar stone opposite it, and driven it forward and a little to the left: a partly buried stone could never have been moved.

To return to our observer. If he stood on the ground anywhere in front of the central blue stone, he would have found the Friar's Heel projecting a long way above the horizon, and if he stood behind, he could not have seen it at all. There is therefore no position from the ground which would put the top of the stone flush with the horizon. If however he stood in the position suggested by popular fancy (or tradition?), that is on the Altar stone itself (the level of which cannot have appreciably changed), the top of the Friar's Heel would be found exactly right; so if the Friar's Heel was used at all, it must have been from here. (The illustration supposes



10. Midsummer Sunrise over the Friar's Heel

the spectator to be a little behind the Altar stone, so as to bring it into the picture.)

The observer would find the alignment less precise than that from the bank, which aims at the first glimpse instead of the fully risen sun, and therefore less suitable for correcting the calendar; but it is better from a spectacular point of view, for the sun could be watched from its first appearance centrally through the entrance, and seen gradually emerging from the horizon, until the whole disc became visible and stood precisely on top of the peak. It may well have had some ceremonial purpose, for which the rising sun would give a few moments to prepare, and for which the Altar stone on which he would be standing, seems appropriate; and it gives an explanation of the shape and position of the Friar's Heel which is reasonable, and the only one possible if the stone served as a pointer.

The alignment, if used as suggested, gives us now a closer estimate than the axis for dating purposes because the points which determine it are so much farther apart, and an error of an inch at either end would mean a difference of only one minute in the bearing, or 70 years in the date. The date calculated from it is 400 years later than that given by the central axis (see note at the end of this chapter), but the agreement is sufficiently close to justify us in thinking that both alignments are intentional.

To estimate the amount of error likely, it should be noted that the human eye cannot distinguish two points nearer than two or three minutes apart, so any alignment on a distant object must be liable to an error of that amount, unless aided by a telescope. The sun on the horizon does not give very sharp

definition, and an error of 5 minutes instead of 2 or 3 might reasonably be expected. At the other end of the alignment the uncertainty about the exact position of the axis introduces another error of about 2 inches in the position of the observer, and this is equivalent to another 2 minutes in the angle. If both errors were in the same direction, there would be a total error of 7 minutes, which is equivalent to 500 years.

The Friar's Heel alignment therefore gives a date anywhere between 500 B.C. and A.D. 500; and since for other reasons, as we shall see, a date after the Roman conquest is impossible, the date must lie roughly between 500 B.C. and our era. It agrees well enough with what one might expect for a people sufficiently civilized to need some means for correcting the calendar; and also with the name that has been given to the stone, if, as it seems, it is Celtic in origin. It will be seen from Part II how well it agrees with other evidence.

NOTES

1. *On the Axis and Friar's Heel Alignments*

The statements made in this chapter are based on Petrie's and Lockyer's surveys, and are arrived at as follows. Lockyer says that his axis passes through the centre of the sarsen circle and within a few inches of the central point between the entrance stones 30 and 1; and by calculation from his data the exact distance is found to be $3\frac{1}{2}$ inches to the left as we look outwards. The central axis, passing through both central points, differs therefore from Lockyer's by $3\frac{1}{2}$ inches in 50 feet, which is equivalent to 20 minutes in the angle.

Lockyer's azimuth is 49 degrees 34 minutes, and from Newcomb's table of obliquity the date would be 1840 B.C. (It has been corrected since Lockyer wrote, so the date he gives is a little different.) The difference of 20 minutes is equivalent to a difference of 1,440 years, so the central axis brings the date to 400 B.C.

As regards the Friar's Heel. Lockyer's axis is 72 minutes to the left of the peak, and therefore passes within 6 feet; and the central axis differs by 20 minutes; both pass through the centre of the circle. A divergence of 20 minutes in 258 feet is equivalent to 18 inches, so the central axis passes within 54 inches of the peak. From the observation point on the Altar stone, 268 feet away, a distance of 54 inches is equivalent to an angle of 58 minutes; the peak therefore will be seen 58 minutes to the right of the central axis.

The sun from its first appearance to the position of being just clear of the horizon moves through a horizontal angle of 52 minutes; its first appearance therefore would be 6 minutes to the right of the central axis, which would mean an alteration of the axis by that amount, and a consequent reduction of the date by 400 years.

The determination is more reliable than may appear at first sight. It seems to depend rather precariously on three things: that the Friar's Heel served as a pointer, that the fully risen sun was aimed at, and that the observer stood on the Altar stone. As a matter of fact however the last two conditions are a consequence of the first, and necessary, unless Stonehenge is to be given a date even more recent.

The midsummer sun, seen from anywhere on the axis, can never have made its first appearance over the Friar's Heel, and will not do so until the distant future; it needs to have been fully risen to give a date sufficiently remote to be possible.

Similarly with regard to the observer's position: the further he comes forward the more is the axis shifted towards the south and the more recent becomes the date; and he cannot have stood farther back because the blue stone hides the view. The Altar stone therefore is not only the one position from which the tip of the Friar's Heel can be seen on the horizon, but is the only possible observation point that does not make Stonehenge too modern. It is not necessary to suppose that the observer always stood exactly at the centre of the stone, so as to be precisely on the axis. The argument supposes that the axis having been laid out for the construction of the monument, some point exactly on it would have been chosen for the alignment, and that this point, within very close limits, is now recognizable.

2. *The Accumulation of Soil*

Colonel Hawley found 19 inches or more of soil and rubble above the solid chalk when excavating in the interior; and the usual depth outside Stonehenge is about 7 inches, so at least a foot has accumulated everywhere. As much as 6 inches may be due to the material excavated from the stone holes and spread all over the area, but the remainder must have been introduced, probably by comparatively recent visitors. Near the Altar stone the ground is very uneven, with a distinct rise in its immediate neighbourhood; the soil there is full of the broken bottles

and other litter of many generations of trippers; and it is easy to realize how as much as 21 inches may have accumulated round it.

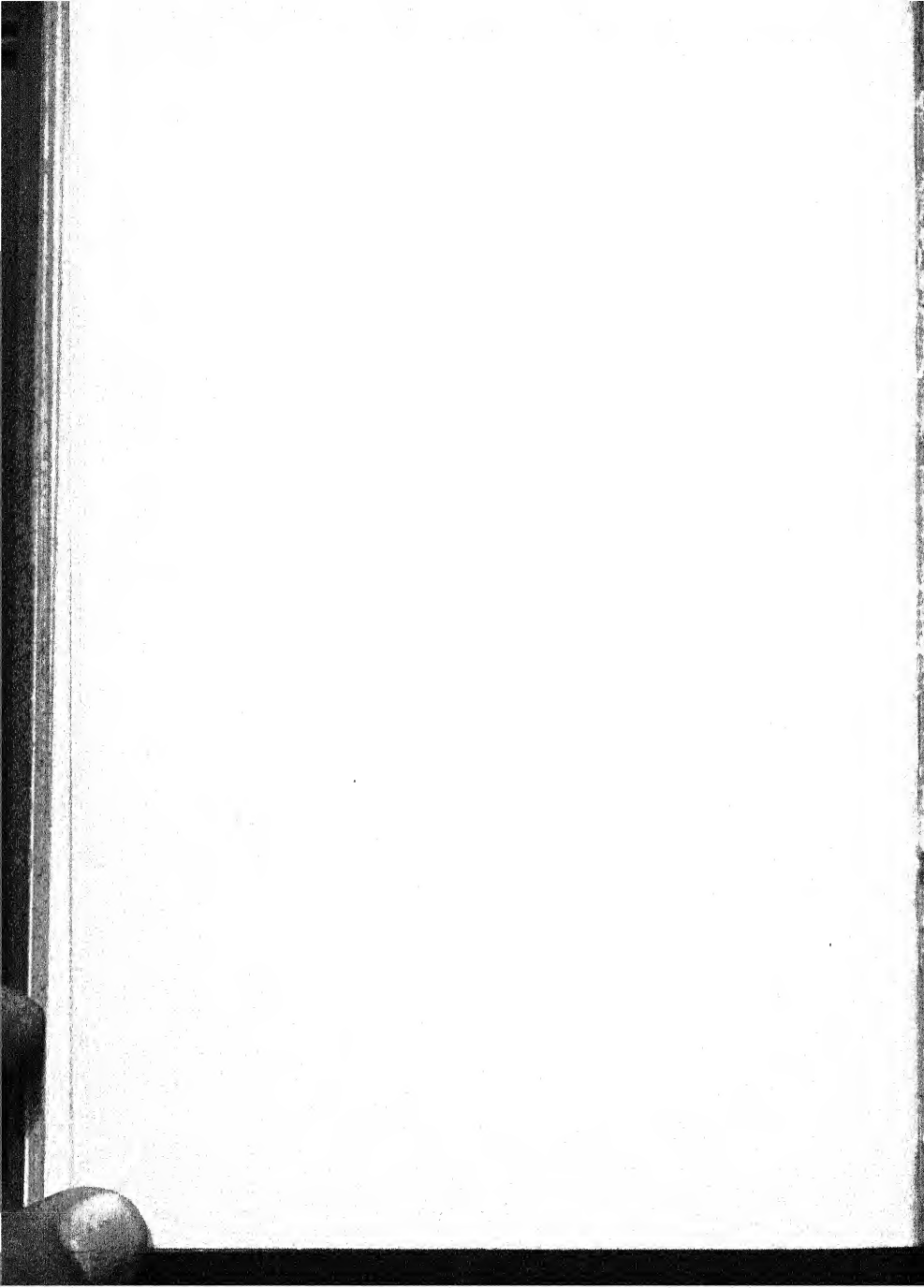
3. *On the Clouded Sunrises*

Sightseers on midsummer morning are so often disappointed by a cloudy morning that the alignments may seem to have been of very little use. But this is to suppose that Stonehenge was meant to be used like a clock needing an annual winding. The observation to correct the calendar could have been wanted only on rare occasions, and the particular year it was obtained would not matter; while the other alignment on the Friar's Heel, being less precise, would be available for quite a week, which would give a good chance of at least one of the mornings being clear.

4. *The Tilt of the Friar's Heel*

The Friar's Heel leans towards the monument, so the tilt, if it occurred after construction, would not seriously alter the bearing. But a stone of this pyramidal shape with a broad base is much less likely to acquire a lean than a flat slab, and the inclination may be intentional. It may have had a ceremonial object, for 'bowing stones' are known elsewhere; or a practical one. The stone is sure to have needed some adjustment after it was launched, such as prising right or left to get the correct line; but if it stood too high—and such a stone is almost certain to carry down some earth with it and so raise the level of the hole—the only remedy would be to tilt it over; and the effect of the inclination at which it now stands is to reduce the height by about 4 inches.

PART II
THE DATE



CHAPTER V

INTRODUCTION

STONEHENGE has been given almost every conceivable date between 2000 B.C., or earlier, and A.D. 900. So much diversity was not surprising in the days when antiquaries for lack of data expended their energies in guessing; but the strange thing is that even now the date wanders through the centuries, though without quite such a wide range; and every attempt to pin it down, even to a period, meets with doubt and opposition. The two latest writers on the subject have stated frankly that the date remains a mystery.

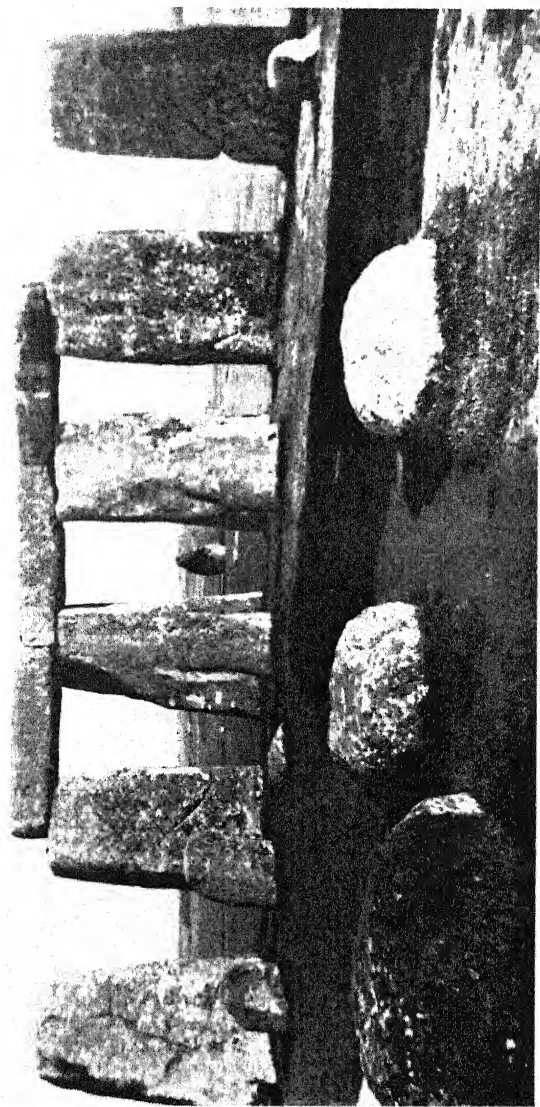
The statement of pros and cons however cannot fail to be interesting, and has the additional attraction that each reader may feel free to choose between them as his judgement directs. There is no orthodox date for the construction, in spite of some pronouncements to the contrary; there is however a general tendency among archaeologists to give the Early Bronze Age the credit, and we shall be able to see how far it is justified.

The chief difficulty is that there are independent lines of thought leading to widely different results: Neolithic or Early Bronze Age, Middle Bronze Age, and Early Iron Age, with dates about 1800, 1200, and 400 to 0 B.C. Only one can be right, and the puzzle is to reconcile them. We must guard our-

selves against the natural tendency to adopt a compromise and choose the middle date; it has no claim to be right merely because there is evidence for an earlier and for a later. We should in fact treat the date problem as we would a detective story in which the author has laid at least two false clues as well as one true one, and carefully sift all the evidence that points to each of them, knowing that one and only one is right. Fortunately with Stonehenge the story is not yet completely told: the northern half of the area is still virgin soil awaiting the spade of the excavator; but it would be a crime to attack this until all the knowledge already gained has been assimilated, and until, to put it bluntly, we know more prehistory. It will be the last chance of coming to a conclusion, and there is only one Stonehenge.

The Two Date Theory

The matter has been complicated by a recent theory that Stonehenge has no single date, but was built at two periods, the ditch and Aubrey circle belonging to the first, and the stones to the second, and it will be well to examine it before tackling the main question. The origin of the Two Date theory was the discovery of the Aubrey holes: their spacing showed that the number of holes must be very nearly that supposed for the blue stones; and it was concluded that the holes may have been the original site of the blue stones before they were moved, on a reconstruction, into the inner circle and horseshoe, and before they were chipped to shape. The original Stonehenge would therefore have been an ordinary circle of rude stones (usually considered



11. ENTRANCE, LOOKING OUTWARDS



Early Bronze Age or Neolithic in date) surrounded by a bank and ditch.

The following facts, then or afterwards, were also adduced to support the theory:

(1) That stone chips were never found at the bottom of the Aubrey holes, proving that the stones had not been chipped when the holes were filled.

(2) That the centre of the Aubrey circle differs from that of the sarsens by about $2\frac{1}{2}$ feet.

(3) That the stones of the Four Stations are placed unsymmetrically among the Aubrey holes, suggesting a different period.

(4) That the ditch might agree in date with the Aubrey holes, but appeared to be earlier than the stones or Avenue.

Opinion has changed about the blue stones ever having been in the Aubrey holes: the shape, size, and nature of the filling all tell against it; and the sides of the holes are not broken away, as one would expect if stones had been extracted; nor would Aubrey have seen depressions there thousands of years afterwards. Colonel Hawley's excavations also show that the numbers do not really match as he had supposed, since he afterwards found the sites of many more blue stones than the original estimate (see p. 12).

It seems equally possible to meet all the other arguments in favour of the Two Date theory, and each will be taken in turn.

1. *The Absence of Stone Chips*

This proves only that the holes were filled before the stones of the inner rings were brought to the spot and dressed. We might have guessed that

this would be the case because a circle, to mark the position of the holes, must have been made by a picketed cord before the area within was encumbered with stones; so in order of erection the posts of the Aubrey circle are almost certain to have come directly after the ditch and before the stones.

2. The Discrepancy in Position of the Centres

The Aubrey posts would have taken a considerable time to put up, and it is not very reasonable to expect that the centre, which is not marked by any post or stone, would have been kept fixed during the whole operation. It could quite easily be found again by trial and error, or still more simply by halving the distance between any two opposite posts, such as Nos. 1 and 29, or 2 and 30. Judging from the holes, the posts varied a little in diameter and were not all truly on the circumference nor exactly evenly spaced, so a small error such as this is easily explained. If the posts had not been there to measure from, the error would almost certainly have been larger.

3. The Stones of the Four Stations

These are placed nearly on the circumference of the Aubrey circle, but not symmetrically with the post holes. It has been supposed that this means that the posts were already decayed, and the stones may have been set up in these positions in order to refind the centre.

It will be remembered that the diagonal lines joining these stones meet at the centre at an angle of 45° . If this was an intentional construction, their position on the Aubrey circle would be exactly

determined, so their lack of symmetry would be a necessary consequence of the construction, and no evidence of a later date. Nor can they have been used to refind the centre, for until the centre was known, the construction of two diameters making angles of 45° with each other and symmetrical with the axis, would have been a problem worthy of Euclid at his best, and be of course quite unnecessary.

For the above reasons it seems unlikely that the Four Stations were intended to have any relation to the centre, and an alternative explanation of their position has been offered on page 31. If it is the correct one, the stones must have been erected after instead of before the sarsen circle, and perhaps a long time after, when the Aubrey posts were in decay; and this may be why their lack of symmetry could be disregarded.

There is some evidence besides their position that they are later than the Aubrey posts, but it is unfortunately evidence that can be interpreted in two ways. Colonel Hawley found that stone 92 is surrounded by a ditch, containing stone chips at the bottom, and that this ditch cuts into Aubrey hole No. 19; it is shallow until it approaches this hole, and then suddenly descends with a steep incline to the depth of the bottom of the hole. Evidently a tall post could not have been standing, or remained standing, when the ditch was dug; but the post might have been decayed and the stump have been left in the hole; and the extraction of the stump seems the most likely reason for the deepened ditch.

The ditch must be later than the Aubrey posts

and may also be later than the stone it surrounds. Colonel Hawley suggests it was dug for the foundations of a log hut, and remarks that the area within the ditch is covered by a level floor of mixed chalk and clay rammed hard; but he found no signs of human occupation. If there was a hut site here, the stone may have been used to support the roof; and this may be the explanation of the similar ditch round the Friar's Heel: the ditch there is described as having nearly vertical sides and cannot have been left open for long, exposed to weathering. These hut sites, if such they were, would of course be later than the monument.

The alternative explanation of the ditch is that it was a 'taboo' ditch, such as is sometimes found surrounding a sacred or ceremonial spot; but it is odd to find a taboo ditch round two of the four station stones, and still odder to find one blocking the fairway on the Avenue.

To sum up. The Four Stations in order of erection are probably later than the Aubrey posts. They may have preceded the erection of any of the other stones, and their position have been found by the construction of two diameters at 45° ; but more probably they are later, and their position depends on the two pairs being each directed on the midsummer sunrise. The second alternative admits of their being very much later than the sarsen circle, and of the Aubrey posts being then in decay; but with neither alternative do they prove that there was any long interval between the Aubrey circle and the rest of the monument.

4. *The Ditch*

The grounds for supposing the ditch to be earlier than the rest of the monument, except the Aubrey holes, are:

(a) The supposed absence of stone chips in the ditch silt.

(b) The filling in of the end of the ditch to make the causeway the same width as the Avenue.

(a) *The Stone Chips*.—The theory supposes that the ditch was silted up before the stones were erected, and that it must therefore have been dug at an earlier period. It is the most plausible of the arguments in favour of two dates, and must in consequence be closely scrutinized.

In order of construction the ditch is certainly likely to have come before the stones; for it makes so true a circle that a picketed cord must have been used to lay it out, and this could only have been done before the stones, which would have prevented the use of a cord, had been set up. After the ditch was made, presumably the Aubrey holes, which also needed a cord, would be dug, and the posts erected; then and not till then the big sarsen stones would be brought in for their final dressing, and lastly the blue stones. The stones were evidently dressed inside the enclosure, for the soil is thick with their chippings; and between them and the ditch is the bank: it would be some time therefore before any pieces of the stones found their way into the ditch, and for still longer the occurrence would be infrequent. After all the work was done there would probably be a general clearing up, and loose material inside would be thrown up on the bank. This

would include stone chips, many of which would eventually fall into the ditch; but for some years stone chips in the ditch would be rare. Meanwhile can it be supposed that the ditch would remain empty? A newly excavated chalk ditch begins at once to fill up by natural silting, since frost breaks up the exposed chalk and all the loosened pieces collect at the bottom. The process can be watched in any chalk quarry on a winter's morning, as soon as the sun begins to thaw the frozen surface; and the almost constant trickle of falling stones shows how rapidly it takes place. With a ditch and bank above it, the rate is increased by falls from the bank, as it becomes undermined, and there will very quickly be a deep deposit of silt along the bottom. The process goes on until the sides have worn back to such a flat slope that the loose chalk can no longer roll, and only the finer stuff will be washed to the bottom; eventually this too is hardly moved, and the ditch is almost in a state of rest. A second stage now begins with the growth of turf and the accumulation of mould, and this continues indefinitely, gradually filling up the ditch.

When such a ditch is excavated the upper layer will be found earthy, then follows a layer of fine silt, generally only a few inches in thickness, and from there to the bottom is the coarse silt, often quite loosely packed together.

The rate at which the silting takes place must be very much the same in all ditches, as it depends entirely on natural conditions; two records have been published, showing how rapid are the early stages. Pitt Rivers, after clearing out the ditch of Wor Barrow, left it exposed for four years, and

during that time found it had silted up to a depth of $2\frac{1}{2}$ feet. The filling must have been entirely due to the weathering of the sides, for the bank had been turfed over and was not affected (*Excavations*, Vol. IV, p. 24, address to the Arch. Inst.). The other instance is of a ditch 5 feet deep dug during the war and examined thirteen years afterwards; the bank was close up to the edge of the ditch and a good deal of it had fallen in, so that there was no less than $3\frac{1}{2}$ feet at the bottom.

If Stonehenge ditch had been crossed by gangs of workers the filling would be much more rapid, but even without supposing this, there would inevitably be a quantity of naturally formed silt in the ditch before the stones began to arrive, and before there were any chips on the site. (The only thing that could have prevented this would be for the ditch to have been kept cleared while the monument was under construction. If it had been, chips would have entered the ditch when the artificial clearing ceased and would now be found on the bottom: their absence proves that it was not kept cleared, but this has no bearing on the Two Date theory.)

Considering the position of the bank, on the inner side, not many stone chips are likely to have fallen into the actual silt at all, none in the first rapid coarse silting, but probably a few at or near the top. The vast majority would be in the earthy filling that comes above.

This, as the excavations show, is exactly what has happened. Mr. Newall puts it concisely in his review of the work published in *Antiquity*, March 1929. 'Blue stone chips,' he says, 'were rarely

found more than a few inches' in the silt. Colonel Hawley's interim report gives more details (*Antiquaries' Journal*, Vols. I-VI and VIII). A section published after the first year's work shows stone chips a few inches deep in the silt, and they are described as occurring down to a depth of 25 inches from the surface, or well below the earthy chalk rubble which overlies the silt. By the second year the Two Date theory had been started, and no more definite information is given about the chips; but they evidently turned up from time to time in the silt, and have to be explained as intrusions:

Sometimes there are cavities which contain in addition to those in the top layer, chips of stone throughout their depth. In this instance it can be inferred that the cavity had been filled at the time Stonehenge was built (Vol. V, p. 22).

Sarsen mauls were occasionally found embedded, that is to say partly sunk, in the silt; they could not have reached this position if they had fallen in after turf had begun to grow, but most of them are explained away by a suspicion that the ditch had been disturbed, or even 'rather disturbed' (Vol. II, p. 50, and Vol. VIII, p. 156). It is in fact impossible to read the report without feeling that the writer is begging the question. The theory of two dates could be supported only by the complete absence of chips, or failing that, by definite signs of disturbance in every case: mere scarcity and finding them only near the top of the silt is just what should be expected, and is no evidence of a long interval.

It is true that the opinion of the excavator ought

to count for much, and this of Colonel Hawley's, that Stonehenge ditch is earlier than the stones, has doubtless been followed by many without much questioning. The excavator sees many details which seem too trifling to report, and can tell much from the mere feel of the soil under his tool; but this does not mean that we must blindly accept every conclusion he arrives at, especially where he allows us, as he should, to see and criticize the evidence on which they are based. Colonel Hawley's reports moreover do not support the Two Date theory, as generally accepted, for he does not think the ditch was contemporary with the Aubrey holes. He believed the ditch to have been originally defensive, with a wide entrance that had to be blocked with posts and stones, and with guard-houses on each side (Vol. IV, p. 36, and Vol. VIII, p. 173). (Besides this wide entrance there are at least two more, of 10 and 3 feet; these entrances, the broad and shallow section of the ditch, the truly circular plan, and the complete absence of any natural strength in the position, are not features one associates with fortification, and the defensive idea has met with no support from archaeologists.) To this an Avenue was added which 'preceded Stonehenge by a fairly long interval' (Vol. V, p. 23). Afterwards came the Aubrey holes, which may 'antedate the monument by a short period' (Vol. VIII, p. 175). And finally came the stones.

It is unnecessary to take up space with discussing his arguments, because these four periods are not generally credited, nor on the face of it seem credible; but in a way they are interesting, for they show what a long time Colonel Hawley supposed a ditch

would take to silt. He cannot of course have seen the report on the war ditch, for it had not yet been published; and it is worth while considering it in some detail, because Stonehenge ditch is about the same depth and acquired the same depth of silt; and there seems no reason why it should not have taken about the same time, thirteen years, to do it, instead of the several centuries that Colonel Hawley and others would give it.

The silted slopes of the war ditch have now flattened out to an angle of about 33° : this is the natural slope of steep chalk downs, and of the better preserved prehistoric earthworks in chalk districts; it is the angle of rest, and very little more silting is likely to take place. Stonehenge ditch is wider, and unless natural silting was helped artificially, it would take a little longer to reach the condition of rest, and there should be less depth of silt in the middle. Actually however there is a considerable depth right across the ditch, generally quite as much as in the war ditch, even where the bottom is 5 or 6 feet wide; but this does not mean that it took longer to accumulate. Under natural conditions there is a definite limit to the amount of silt a ditch can receive before the growth of turf checks any further increase, and the rate at which it is acquired cannot be slowed down though it may be hastened. The amount depends only on the depth of the ditch, and if there is more than the normal for that depth, fresh material must have been brought in.

Evidently this is what has happened at Stonehenge, and it is only natural with a ditch and bank that had constantly to be crossed. For example in one section described in Vol. VIII, page 164, the

abnormal width of $13\frac{1}{2}$ feet at the bottom was covered, instead of the ordinary silt, by an 'extremely hard dirty earthy chalk': such a wide shallow ditch could not possibly have been filled all across by natural silting, and evidently fresh material from the bank has been trampled into it. No doubt this happened in many places, and there is further evidence of it in the scarcity of relics (see p. 107), showing that the filling took place quickly; and in the very steep sides of the ditch. Pitt Rivers long ago pointed out what must be the section of a normally silted ditch: it is trumpet shaped, flat at the top where the sides have longest weathered, and steep at the bottom where the fallen silt has protected them. Stonehenge ditch is often steep to quite near the top, showing that the upper slopes were protected as well as the lower, and this protection can only have been given by artificial filling.

(b) *The Ditch Causeway*.—In describing the ditch it has been explained how the end that intrudes on the Avenue has been filled up to make the width of the causeway agree with that of the Avenue. At first sight this suggests that the ditch cannot have been made at the same period as the Avenue and must be definitely earlier; but the description of the filled-in portion shows that this is not so. If an old naturally silted ditch had been levelled across, the excavators must have found the old turf line and signs of natural silting below the artificial filling, but actually did find nothing of the kind. Also the sides and end of the ditch would have weathered back to a gentle slope, while actually the ditch ends with a 'nearly perpendicular wall of solid chalk 4 feet 9 inches high' (Vol. IV, p. 32).

The natural explanation of these conditions is that this part of the ditch was filled up again very soon after it was excavated, and before silting had begun; but an alternative has been offered (*Wilts Gazette*, July 6th, 1933) that must be considered. It is that the end of the ditch was cleared and deepened to provide material, afterwards returned, for the ramps and mounds needed to erect the lintels. A careful study of the report however shows that this will not do; for Colonel Hawley is emphatic that the filling was 'clean white chalk', and anything taken from an old ditch would be well mixed with earth, and after use for the lintels, probably with chippings from the stones as well.

The ditch indeed is not likely to have been excavated anywhere to provide material, for if timber was used as well as chalk, the contents of the stone holes would probably have furnished all the chalk needed, and if any more was wanted, it is much more likely to have come from the bank than the ditch.

We must conclude from the evidence that the ditch where it cuts into the Avenue was deliberately filled soon after it was dug, and that the filling was done to make the causeway match the Avenue. This may have been because the ditch was carried too far by mistake, or because the Avenue was an after-thought: whatever the reason, it is quite clear that the ditch and Avenue are practically contemporary; and there is nothing in this to prove that Stonehenge is of two dates.

Not only is it possible to meet all the arguments for two dates, but there is some direct evidence to the contrary. Woodhenge will be described in the

next chapter, and it is sufficient to say here that the dimensions and plan of Stonehenge, *including the Aubrey circle*, follow closely those of Woodhenge; and it is not reasonable to suppose that the copying was done at two different periods, first with only an outer ring and then with all the interior.

At Stonehenge itself the Aubrey circle is spaced with an accuracy superior to that of any other prehistoric circle except the sarsen circle, and it would be a strange coincidence if such work was done twice at the same place, but at widely different dates. It is also in symmetry with the rest of the monument, showing that an axis aligned on the midsummer sunrise was already contemplated. This may be overlooked, as no two holes are actually on the axis, one is just to the right and one just to the left; but this is the arrangement at Woodhenge, which has a similar orientation. (Since the Aubrey centre is not quite the same as that of the stones, the axis, passing through the Aubrey centre, is also not quite the same, but is parallel to it, i.e. has the same alignment.)

The Avenue of course is also oriented, and we have seen that it is contemporary with the ditch; so what under the Two Date theory is the earlier Stonehenge includes the Avenue, and is oriented like the rest of the monument and like Woodhenge. In fact we could hardly expect to find the Aubrey holes and ditch more closely linked with the stones than they are: evidently only one plan has been followed throughout, and what is merely a sequence in construction has been taken, in the Two Date theory, to imply a long interval and different dates.

Some apology may seem needed for discussing

the theory at such length; it has however found its way into all recent books and papers on Stonehenge and is usually considered an established fact. The evidence for it has been given as fully and as impartially as I can, and the reader may be surprised to find how slender it is. He must make up his mind whether or not to accept it, before passing on to the next chapters, for it will not be alluded to again, even as a possibility. To reject the Two Date theory however does not mean that every part of Stonehenge must necessarily belong to the same period. The arguments given are in favour of a single date for the ditch, Aubrey holes, and sarsens, that is to say the main structure. But there may have been later additions to it: the Z and Y holes for instance are very suspicious, also the blue stone circle and, as already remarked, the Four Stations. These possibilities will be discussed in due course; they are not what is generally considered as the Two Date theory.

CHAPTER VI

EXTERNAL EVIDENCE

THE first record of Stonehenge in history goes back further than that of any other monument in the kingdom. Perhaps it was known to the Greeks of the fourth century B.C.: Diodorus Siculus, writing about the beginning of our era, quotes Hecataeus, a Greek historian of about 320 B.C., to the following effect:

Opposite to the land of the Celts there exists in the ocean an island, not smaller than Sicily, inhabited by the Hyperboreans . . . They honour Apollo more than any other deity. A sacred enclosure is dedicated to him in the island, as well as a magnificent circular temple adorned with many rich offerings.

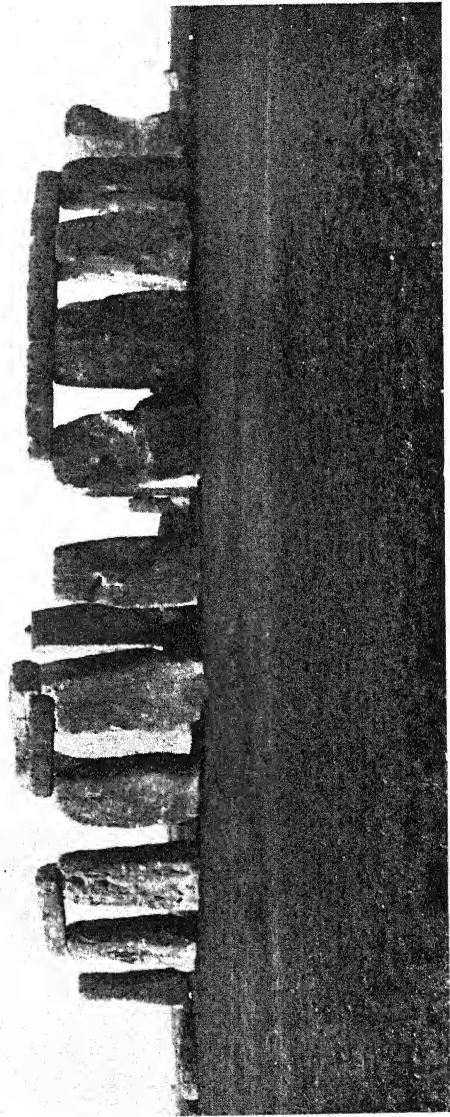
Great Britain would answer very well for the island not smaller than Sicily (note the admirable caution of the description: the narrator seems to have penetrated some distance into the country, but could only guess how far it extended), and though we cannot be sure that Hecataeus meant Stonehenge, there is nowhere else where we could point to a magnificent circular temple to the sun whose fame is likely to have reached Greece; and it is not very probable that anything of the kind so comparatively recent should have completely disappeared.

If the reference is to Stonehenge it would not only prove that the monument was in being in the fourth

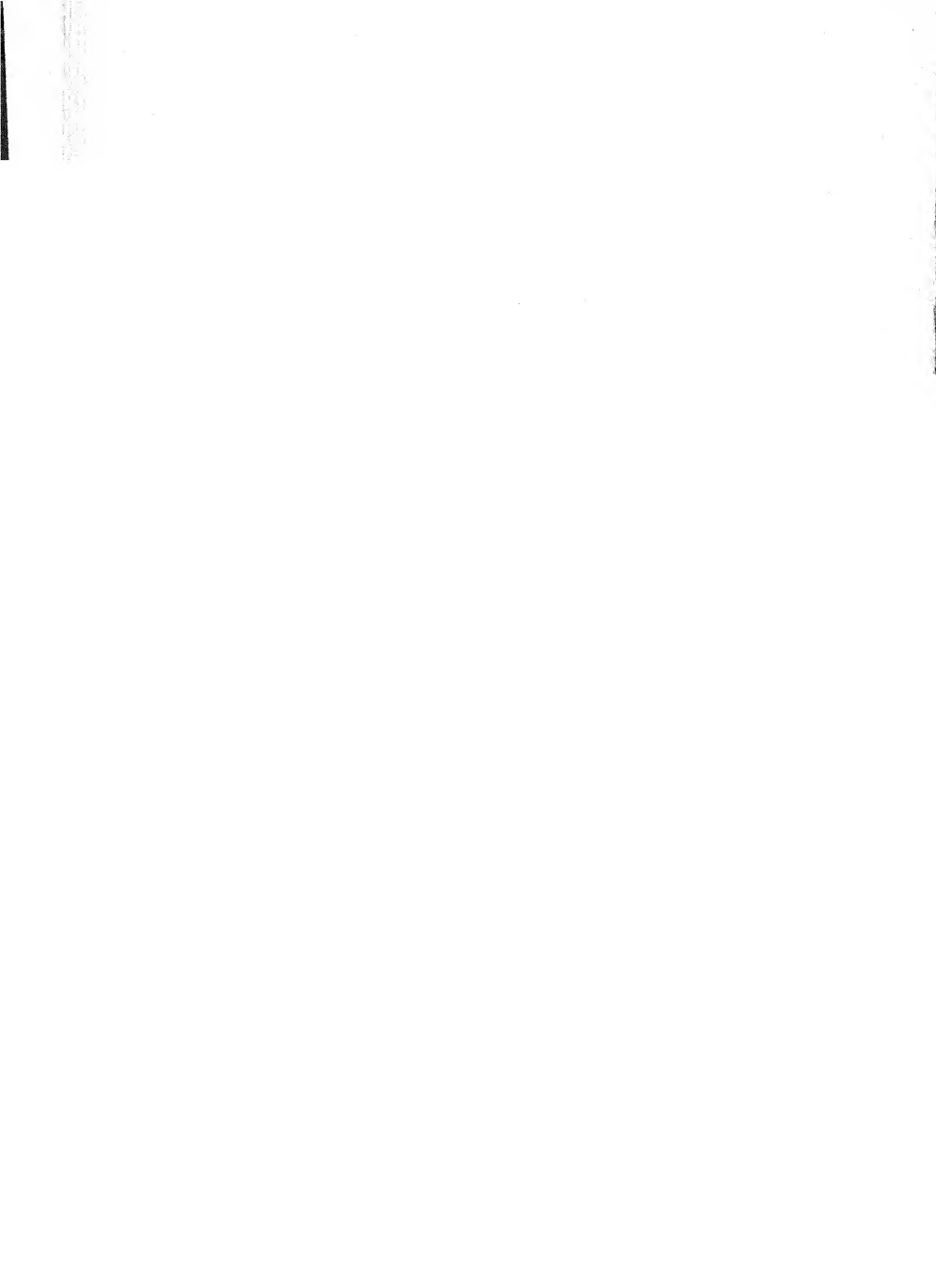
century B.C., but would suggest that it cannot have been built many hundreds of years before; and this perhaps is why the evidence has not usually been considered of much account. Another consequence of ascribing the reference to Stonehenge is that we could, without further dispute, call it a temple to the sun. Doubts in the matter are perhaps an unconscious reaction from Stukeley's extravagant claims; but to call it a temple does not really imply a belief in the lustrations, sacrifices, serpents, and all the other creations of this imaginative antiquary. Even without the prompting of Hecataeus, Stonehenge does seem to be something more than a sepulchre however grandiose; and if not a sepulchre, a temple is as good a name to give it as any other; and the circular shape and orientation both suggest a connexion with the sun and, we may suppose, its worship.

The Romans do not mention Stonehenge, and for a time antiquaries supposed this may have been because Stonehenge was not yet built; but the Romans were singularly indifferent to such matters, and we now know from Colonel Hawley's excavations that it must certainly have been in existence very soon after the Roman conquest, and therefore almost as certainly before.

The first certain mention in history is not until the twelfth century, in Geoffrey of Monmouth's *History of Britain*. Though it is impossible to accept Geoffrey's attribution of Stonehenge to the Britons of the fifth century A.D., his account is worth quoting: it is given fully in Bohn's edition of *Six Old English Chronicles*, and may be condensed as follows:



12. VIEW FROM THE EAST



Hengist, the leader of the invading Saxons, had called a conference to discuss terms of peace with the Britons, and treacherously instructed his followers to bring with them their long knives. They met at Amesbury and

began to treat of peace, and when an opportunity offered of executing his villainy, Hengist cried out 'Nemet oure Saxas', and at the same instant seized Vortigern, and held him by his cloak. The Saxons, upon the signal given, drew their long knives, and falling upon the princes, who little suspected any such design, assassinated them to the number of 460 barons and consuls. . . .

Aurelius, the new British king, subsequently defeated Hengist and decided to erect a fitting memorial to the slain and called upon Merlin to advise him.

'If you are desirous,' said Merlin, 'to honour the burying-place of these men with an everlasting monument, send for the Giant's Dance, which is in Killaraus, a mountain in Ireland. For there is a structure of stones there, which none of this age could raise without a profound knowledge of the mechanical arts. They are stones of a vast magnitude and wonderful quality; and if they can be placed here, as they are there, round this spot of ground, they will stand for ever.'

At these words of Merlin, Aurelius burst into laughter, and said, 'How is it possible to remove such vast stones from so distant a country, as if Britain was not furnished with stones fit for the work?' Merlin replied, 'I entreat your majesty to forbear vain laughter; for what I say is without vanity. They are mystical stones, and of a medicinal virtue. The giants of old brought them from the furthest coast of Africa, and placed them in Ireland, while they inhabited that country. . . .'

When the Britons heard this, they resolved to send for

the stones, and to make war on the people of Ireland if they should offer to detain them. And to accomplish this business they made choice of Uther Pendragon (the king's brother and father of the legendary Arthur), who was to be attended with fifteen thousand men. They chose also Merlin himself, by whose direction the whole affair was to be managed. A fleet therefore being got ready, they set sail, and with a fair wind arrived in Ireland.

After the defeat of the Irish the Britons went to the mountain Killaraus, where the sight of the stones 'filled them both with joy and admiration'. But all their attempts to move them were without avail until Merlin 'had placed in order the engines that were necessary and took down the stones with incredible facility'. The story ends with the re-erection of the stones on Salisbury Plain in the presence of the bishops and abbots and all the great men of the kingdom, Merlin again giving 'a manifest proof of the prevalence of art above strength'.

Memory lasts long with a primitive folk, and it is tempting to believe that the expedition to Ireland is a distorted remembrance of fetching the blue stones from Wales, or at least of the stones being of foreign origin.

Megaliths

In the absence of direct evidence it is natural to inquire whether dating by analogy is possible, that is to say whether there are any similar structures the date of which is known. Until a few years ago a good deal of confidence was placed in what was called a megalithic age, during which it was supposed all the big stone monuments of Western Europe were built. It was the period of chambered barrows,

which were sometimes surrounded by other stones arranged in a rude circle; they are datable to the transition between Neolithic and Early Bronze Age, about 1800 B.C., or to the Neolithic Age itself; and a typical example is the West Kennett long barrow in Wiltshire. Stonehenge was considered to be the most elaborate of these megaliths and therefore perhaps the latest, but the fact that it was a circle of big stones seemed to place it, if not in the Neolithic, at least in the Early Bronze Age.

With further knowledge, however, a single age for all megaliths is becoming very doubtful. For one thing it has been disappointingly difficult to date stone circles at all: Scottish sepulchral circles have proved to be Bronze Age, but the English circles are almost all still undated—chiefly because they do not seem to have contained any primary burial—and recently a Scottish circle of the 'recumbent stone' type has been found with Iron Age pottery, apparently coeval with the stones (*Antiquity*, Dec. 1932). The Scandinavian stone circles are also thought to be Iron Age in date (*Antiquity*, Sept. 1928). Stone circles in fact may have originated as the surround to a Neolithic or Bronze Age burial, and have continued in use to a much later period as sacred enclosures, and without a burial.

For another thing it seems more than doubtful whether there is sufficient likeness between Stonehenge and other megaliths to draw the conclusion of a similar date. As already remarked it is in many ways unique, especially in those which show a great advance in technical skill; and we may be as wrong in dating it with others as we should be in dating St. Paul's Cathedral by analogy with a Saxon church.

Woodhenge

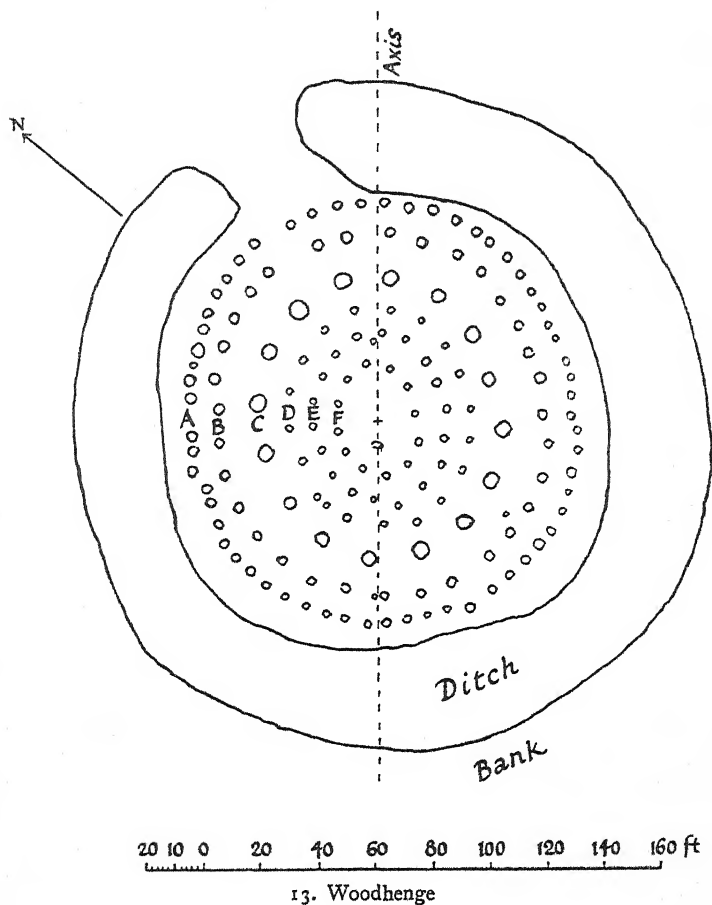
Although comparison with other megaliths is of very doubtful value, we may in Woodhenge have found not only something similar, but perhaps the prototype itself. It was a structure of wooden posts arranged in concentric ovals, which are very nearly circles. The wood of course has decayed, but the holes in which the posts stood have been found, and their plan resembles that of Stonehenge.

There are six concentric ovals, A, B, C, D, E, and F, and judging by the size and depth of the holes, ring C held much the largest posts; its long diameter is $96\frac{1}{2}$ feet, which is almost precisely that of the big sarsen circle at Stonehenge. The diameters of the inner rings D, E, and F, are respectively 74, 57, and 39 feet, and correspond to the diameters of the blue stone circle and the circular portion of the trilithon and blue stone horseshoes. The outer A ring is almost exactly half that of the outer Aubrey circle at Stonehenge (145 and 288 feet respectively); and since there are 60 posts in one and 56 in the other, the distance apart of the posts is also very nearly half.

Such close resemblance in dimensions can hardly be chance (but see p. 128); and there is besides other evidence of a like nature.

The most important is the orientation, for Woodhenge, like Stonehenge, seems to be directed on the midsummer sunrise. Among prehistoric monuments orientation in this direction is extremely unusual, so if this is established as a fact, it would be in itself very strong evidence of relation. It is indicated by all the ovals pointing with their long axes

in this direction; and they are designed, not haphazard, shapes, like so many of the so-called ovals of



prehistoric 'circles', because the long axis of each is greater than the short by the same amount; nor are

they just copied one from another, because the number of holes differs. The direction of the ovals only indicates without defining the axis; but this is given quite precisely by the arrangement of post holes on each side of it. The posts would be too tall to see over, so instead of being exactly on the sunrise line, the holes are placed alternatively right and left and at the same distance from it, so that sunrise would be seen between them. Extra posts at the ends of the sighting line, one in the B ring, and one at the northern side of the E ring, help still further to define it. These extra holes are shallower than those in the rings and differently spaced; and similar extra post holes indicate the direction of the west where the sun sets at the equinox, and of the south where the sun is highest.

It will be noticed that the alternate right and left arrangement of the holes does not extend to the northern half of the rings; but to an observer on the southern side they would be so far off as to be almost entirely hidden by the nearer group, and therefore not wanted; and the nearer ones would define the axis quite accurately.

It has been objected against an intentional orientation that the surrounding bank may have hidden the sunrise; but to an observer near the A ring this could have been the case only if the bank was over seven feet high, and there is no reason to suppose it was as much as this.

In excavating within the inner oval at Woodhenge nothing was found at the centre point, just as nothing has been found at Stonehenge; but a shallow grave containing the bones of a child was found in precisely the same relative position as the Altar stone at Stone-

henge. It lies across the axis, at right angles to it, and half-way between the centre and the circumference of the inner circle. The skull had been split in two before burial, and the excavators consider the burial was dedicatory. Incidentally it should be noted that the position is further evidence of an oriented axis; but its principal interest is in the correspondence to the Altar stone, and the inference that the Altar stone is not a fallen upright, but was intended to lie in its present position.

It is important also to notice that the entrance causeway of Woodhenge ditch is not on the axis, but a little to the north of it. The causeway at Stonehenge was also originally a little to the north of the axis, but was immediately corrected as we have seen by filling in the ditch. The discrepancy at Stonehenge was much smaller than at Woodhenge, and its nearness to the axis perhaps suggested the idea that the causeway might be made symmetrical. So placed it makes another link with Woodhenge, and also strongly suggests that Stonehenge is later; for it is hardly likely that if Woodhenge was copied from Stonehenge, such an obviously better design should have been neglected in the later monument. Other evidences that Stonehenge is the later are the improvement in design and execution throughout, and the unlikelihood of an inferior copy being made so close while Stonehenge was still in being. A rather more subtle reason lies in the dimensions of the respective rings. We have seen how closely they agree, but have not discussed which is likely to be the original and which the copy.

The four inner ovals at Woodhenge each increase in size by the same amount, and the last of them, the

big C ring, is 96 feet in its long diameter. If the unit of measure used at Woodhenge was .96 feet instead of exactly 1 foot, the C ring would be 100 feet in diameter and the others 80, 60, and 40 respectively. These dimensions, using a decimal notation and reckoning in feet, can hardly be accidental, and that they are intentional is confirmed by the next two rings following the same system with diameters of 130 and 150 feet respectively. It is not surprising that the foot, which is a natural unit based on the human foot, should not be exactly the same as ours, but it does happen to be almost exactly the same as the Roman.

The Stonehenge measurements, though like the Woodhenge, do not show the same precise graduation; they could have been copied with slight variations from Woodhenge; but, since they are less precise, Woodhenge could not have been copied from them.

The posts at Woodhenge may have lasted two or even three centuries, but hardly more, so if Stonehenge is a copy, it must have been built within say 300 years after Woodhenge. The most probable date for Woodhenge is about 1500 B.C.; it was certainly not earlier, but until more is known about the unique type of pottery found there, it would be rash to say that the date is definitely fixed, and it might be later.

If 1500 B.C. is right and Stonehenge is a copy, its date would be about 1200 or 1300 B.C. and certainly not much earlier than 1400 B.C. As will be seen later, this limit is important when considering the evidence from Boles Barrow. (For further information see *Woodhenge* by Mrs. Cunnington (1929).)

Analogy with Classic Architecture

The unlikeness of Stonehenge to all other megaliths suggests that the link may be with a much later architecture. Mr. Kendrick in *The Druids* has expressed this view as follows:

We have in the present version of Stonehenge an architectural achievement that is completely beyond anything hitherto attempted in the ordinary megalithic tradition. . . . The spirit of the work is different: the rugged and lumbering boulder-masses are succeeded by a severe precision of outline; clumsy weight is transformed into balanced stateliness; the area of the enclosure is sacrificed to increase the height and dignity of the pillars; a novel horseshoe plan was invented for the central court. But apart from the careful dressing of the stone, the builders employed a new device in the megalithic architecture of Europe; for the cross-pieces of the trilithons are secured to the uprights by means of a peg-and-socket lock, a trick which I think they could only have learnt at second-hand from those who had some knowledge of the temple-masonry of Greece and Rome. It is the principle of the ordinary classical method of assembling the members of a column, though at Stonehenge the tenon is only a stone projection on the top of the uprights.

Besides the details of construction he has specially mentioned, there are other features in the monument of a like nature: the lintels cut to the curve on which they lie, the wider top to eliminate perspective, and the very exact spacing of the stones. None of these strike the eye, and they can be tested only by actual measurement. Anyone acquainted with Greek architecture will recognize these refinements as something familiar; but they seem altogether out of keeping with the early prehistoric work of this country.

The Greek colony of Marseilles was founded about 600 B.C., and classical influence may have reached Britain two or three centuries later; but the historical evidence for it does not go back very far.

In Caesar's time the Druids of Gaul wrote in Greek: 'They do not commit these utterances (their verses) to writing, although in almost all other matters and in their public and private accounts, they make use of Greek letters' (*De Bello Gallico*, VI, 14).

They also professed the Pythagorean doctrine of the transmigration of souls, though Mr. Kendrick is inclined to discount this as probably of independent origin; and they are said to have studied astronomy, and, it may be supposed, were able to make use of it for correcting their calendar.

None of these links can be proved earlier than the first century B.C., and it is to this century that Mr. Kendrick would date Stonehenge (*The Druids*, p. 155. In his later book, *The Archaeology of England and Wales*, this view is less strongly held).

On the other hand the Gaulish Druids were certainly known to the Greeks as early as 200 B.C., and must by that time have been well established, while the British cult according to Caesar was the parent and therefore still earlier: 'It is believed their rule of life was discovered in Britain and transferred thence to Gaul, and to-day those who would study the subject more accurately journey as a rule to Britain to learn it' (*De Bello Gallico*, VI, 13).

It is also known that the Celts on the continent were in touch as early as the fifth century with the Etruscans of Italy and Greeks of Marseilles. There seems no reason therefore why some knowledge of

classical methods in architecture should not have reached Britain as early as the fourth century, or that Hecataeus should not have been referring to Stonehenge when he wrote, about 320 B.C., of the circular temple dedicated to Apollo. The contact need not have been a close one, and, as some archaeologists think, the architect may have been a foreigner.

There is evidence, as will be seen in the discussion of the Z and Y holes, of a distinct loss of skill when additions were made at a later date; and this would support the idea that the early work was done at a time when contact with the Continent was recent. There is of course ample evidence of Celtic immigration into Britain in the fourth century and earlier.

Racial Evidence

Our knowledge of the 'Ancient Britons' has so much increased in recent years that it becomes reasonable to inquire which of our ancestors seems most fitted for such an original and ambitious piece of work as the building of Stonehenge, and for which of them it seems most unlikely.

The first Neolithic settlers, who made the chambered barrows, have given no evidence of the capacity and organization needed, and much of what was formerly attributed to them is now believed to be the work of their successors, the Beaker people of the Early Bronze Age. These arrived in England about 1800 B.C. and are known to have been a vigorous and progressive race which spread over the greater part of Europe. They had already a knowledge of bronze, and made a distinctive and superior kind of pottery known as the 'beaker' or 'drinking

cup'; and they were men of a robust build and large brain capacity.

The two races seem to have mingled without conflict, and the Middle and Late Bronze Age folk were probably their descendants. Not much is known about them and not a single living site, but judging from their tools and the absence of any fortification, they were a peaceful and unprogressive people who effected little change in the industrial arts, and their pottery is actually inferior to that of the Beaker people who preceded them.

A great change began about 700 B.C. with new migrations from the Continent, perhaps of the early Celts; and by 400 or 500 B.C. they were bringing to Britain the culture of the highly civilized area of which the typical site is Halstatt, and shortly afterwards the still more advanced culture of La Tène. These are the people who under Brennus sacked Rome; they were evidently a warlike, able, and enterprising race, using iron, and showing an immense development in the arts. It was the period of the huge earthworks such as Yarnbury Castle near Stonehenge, and of the many habitation sites, fortified or otherwise, which covered Salisbury Plain.

In this rapid review of the candidates, two races stand out pre-eminently: the Beaker folk who built the rude but gigantic stone circles of Avebury (*Archæology of Wiltshire*, p. 55), and the Celts of the Early Iron Age; while the least likely to have undertaken such a work as Stonehenge seem to be the Middle and Late Bronze Age people between the years 1500 and 700 B.C.

In addition to history and analogy there is some evidence outside the Stonehenge area from excava-

tions, and it will be convenient to deal with this before taking the evidence from Stonehenge itself. Much the most important is concerned with the blue stones.

Blue Stone from Boles Barrow

This 'long barrow', 14 miles west of Salisbury, was opened by William Cunnington in 1801. He found in the centre a great pile of stones and flints running lengthwise like the ridge of a house, under which were the bones of many skeletons. It is a typical long barrow interment, and its chief interest lies in Cunnington's description of the stones. They were sarsens, ranging from 28 to 200 pounds in weight, and among them was a specimen of 'the Blue hard stone also, ye same to some of the upright stones in ye inner circle at Stonehenge'. Cunnington took away some of these stones, including the blue stone, to set up in his garden; and his great-grandson, B. H. Cunnington, by means of some old family letters has been able to identify it where it then stood in the garden of Heytesbury House. (It has now been moved to the Salisbury museum.) It is about $2\frac{1}{2}$ feet high and wide and $1\frac{1}{2}$ thick; and a specimen from it has been pronounced by Dr. Thomas to be an authentic blue stone (*Wilts. Arch. Mag.*, Vol. XLII). It has therefore been possible to confirm William Cunnington's discovery, and with our greater geological knowledge 120 years later, to say with confidence that a blue stone, and therefore presumably all the blue stones, was in southern Wiltshire during the long barrow period, about 1800 B.C. It is a very natural inference that Stonehenge was erected when the stones were

brought from Wales, and is therefore at least as old; and were it not that there is evidence to the contrary, we should be perfectly satisfied with it.

It is important to notice that the evidence points to Stonehenge being at least as old as 1800 B.C.: it proves that or it proves nothing, and there can be no compromise. The only escape is to suppose that the stones when first brought from Wales were not used at Stonehenge, and that the builders of Stonehenge afterwards found them in Wiltshire and set them up in their monument—they may for instance have been used first for the surround to a long barrow. Should this have been the case, the date of their first arrival would have no bearing on the date of Stonehenge, or in other words the evidence of Boles Barrow would be valueless. It seems a gratuitous assumption, and it could be justified only if on other grounds we must give Stonehenge a date later than the long barrow period. Looked at from another point of view, we can say that if Stonehenge is later than 1800 B.C., the blue stones must have been in Wiltshire before it was built; and this is important. Some special sanctity attached to them in Wales may account for their subsequent use at Stonehenge, and even for their foreign origin being remembered until the time of the Normans. It might also account for the occasional presence of the stone in barrows such as Boles Barrow, and the next to be considered.

Blue Stone in other Barrows

Chippings of blue stone are said to have been found in three Wiltshire barrows. The evidence is given fully in *Antiquity* for June 1929, and for only

one of them is it really of any value. This is No. 16 in Hoare's list, opened by William Cunnington, who describes it as a mutilated flat barrow 76 feet in diameter and only 3 feet high, and infested with rabbits. It had previously been opened by Stukeley who did not however discover the primary interment, which was in a circular cist and consisted of burnt bones associated with Bronze Age objects. A number of sarsen chips were found in the barrow, and, on removing the earth from over the cist, a large piece of blue stone. Cunnington's description shows that the sarsen chips were found with the remains of two skeletons in the soil already disturbed by Stukeley, and they might well have been introduced by secondary interments of any date. Whether this could have been the case with the large piece of blue stone is more doubtful. Cunnington may have thought that the blue stone was in undisturbed soil; but, considering the shallowness of the barrow, the number of rabbits, the previous opening by Stukeley, and the secondary interments, it seems hardly safe to attach much importance to such evidence.

Beads in Barrows

Glass beads very closely resembling Egyptian beads of the period 1300 to 1500 B.C. have been found in twenty-two barrows in Wiltshire, also in some other English counties, and in Scotland; but nothing else that could possibly suggest an Egyptian origin. When the evidence for dating Stonehenge was so scarce that any clue, however remote, was eagerly seized upon, these Wiltshire beads could play quite a prominent part. The

discussion turned on whether they must necessarily be foreign or might have been produced locally. Even now it is not settled, but the importance of the answer, as regards Stonehenge, has faded into comparative insignificance: a few beads of doubtful origin, found elsewhere, can hardly be of much value in dating Stonehenge.

The Situation

There are a very large number of barrows in the neighbourhood of Stonehenge, presumably mostly of the Bronze Age; and it has been supposed that the Bronze Age people may have chosen a site for their burial tumuli near the monument, which must therefore be earlier in date.

The argument however, if there is anything in it at all, can be used as well or better in the reverse direction, to show that the builders of Stonehenge chose a site already hallowed by the tumuli. They form only one of several groups on Salisbury Plain; nor does Stonehenge seem in any noticeable way to have attracted them, for they are distributed over the area and not congregated near the stones, nor even predominantly in sight of them.

CHAPTER VII

INTERNAL EVIDENCE

THE direct evidence for the date of Stonehenge depends chiefly on Colonel Hawley's excavations, of which the interim reports were published in the *Antiquaries' Journal*, Vols. I to VI and VIII. They have already been made use of in Chapter V and, as in that chapter, the references, unless otherwise stated, will be to these volumes. No final report has been published; but Colonel Hawley has very briefly summed up the more important of his conclusions in the last volume.

The Ditch

The ditch in relation to the Two Date theory has been described in Chapter V, and an explanation has been given of the two layers into which the ditch filling may be divided: a top layer reaching to the surface, and a silted layer, which must be nearly contemporary with the digging of the ditch. The latter should be much the more important as evidence, but unfortunately it contained very few relics of any kind: some animal bones and worked flints, two small scraps of unidentified pottery, and at the bottom a number of deer-horn picks and roughly chipped flints. Nothing is datable: the deer-horn picks could have been made at any time, and instances are known of their use almost to the

present day in isolated parts of Scotland; and the flints at the bottom are so rude as to be almost palaeolithic in type, and if they suggest anything it is that the art of flint chipping was in decay when they were made, and that the ditch is late in date. No flints of the recognized Megalithic Age type were found among them (Vol. VI, p. 24). The rough flint tools such as scrapers or borers, occurring throughout the ditch and in the stone holes, might be found anywhere in the soil of Salisbury Plain, as the searcher for flint implements knows; and they are not, as Colonel Hawley supposed (Vol. V, p. 22), necessarily Neolithic.

The absence of such relics as bone implements and pottery gives no clue to the date, for they were in common use long before Stonehenge was thought of; but it does support the view already taken that the filling of the ditch was exceptionally rapid, and not only due to natural causes: Stonehenge was not of course an 'occupation site', but only two scraps of pottery in 180 yards of ditch is a very meagre allowance for a ditch that has been open for any length of time. (A few sherds may have been overlooked, since the greater part of Stonehenge ditch was dug single-handed, without an observer to watch the throw-out; but there was evidently extremely little.)

Just as the absence of pottery or bone implements does not mean that the ditch is pre-Neolithic or pre-human, so the absence of metal does not prove a pre-metallic age. Metal is always much scarcer than pottery, whatever may be the age of the site; and a complete absence of metal, when other relics are so scarce, is only what should be expected.

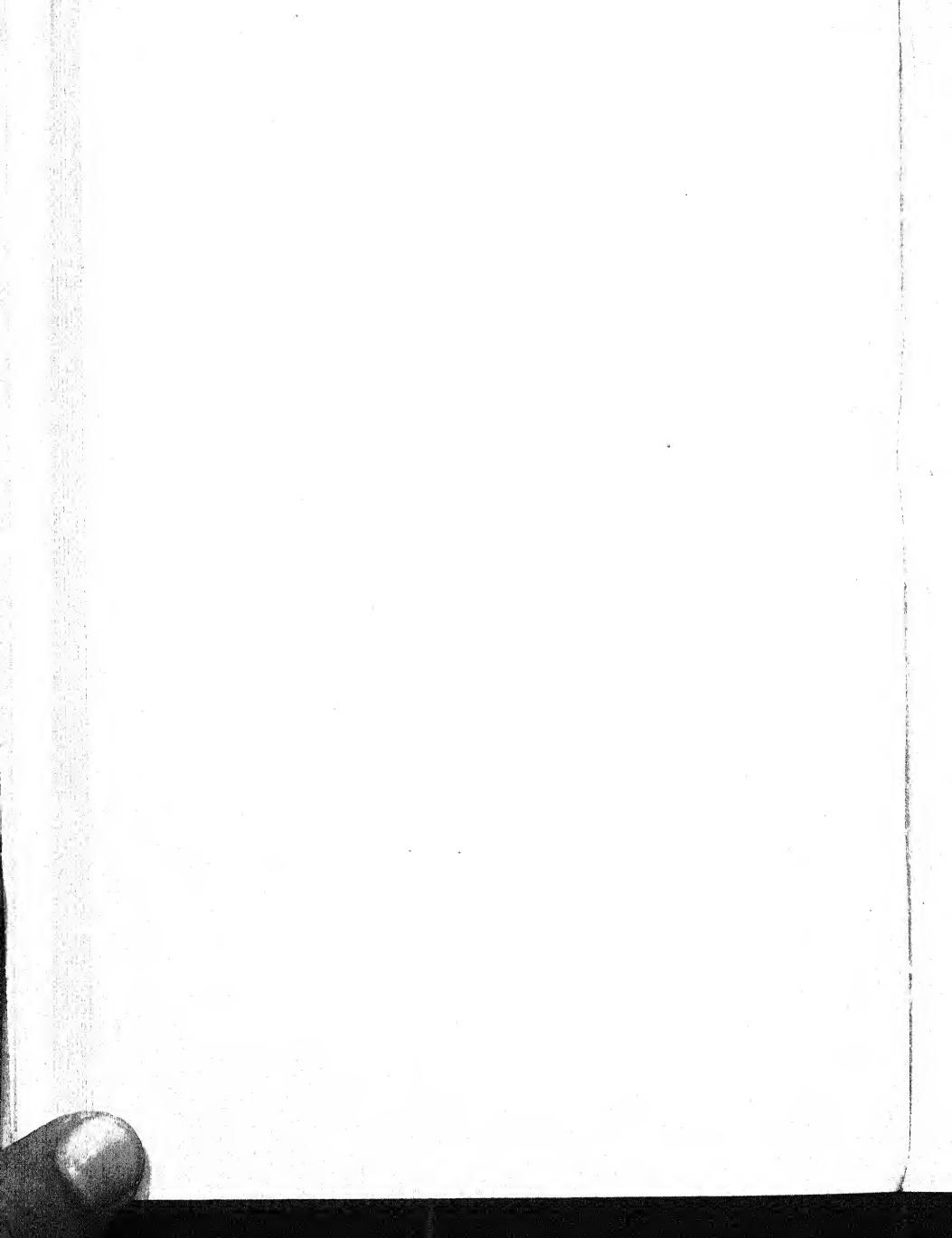


FROM THE NORTH, FACING EAST



THE SOUTHERN TRILITHONS

14. THE STONES FROM WITHIN THE CIRCLE



Lying on top of the fine silt and partly embedded in it, Colonel Hawley twice found some small scraps of Beaker pottery collected together; they were evidently fragments of larger pieces (not whole pots) that had been trodden on, or otherwise broken up, while lying in the ditch. As no other pottery was found actually embedded in the silt, he concluded that 'it belonged to a people who arrived when the silting was nearly or quite completed' (Vol. VIII, p. 173), and therefore dates Stonehenge to the Beaker period, or transition from Neolithic to Early Bronze Age. A few scraps of Beaker pottery were also found among the later pottery of the top layer, and occasional sherds would crop up almost anywhere in the soil of Salisbury Plain where such extensive excavations had been carried out. These chance finds therefore cannot be of any value in dating Stonehenge, and we must recognize that the whole of the lower, silted part of the ditch has given no satisfactory clue, and only negative evidence for dating the monument.

The top layer, representing the growth of turf after the silting had ceased, must, as explained, have begun to form not long after the construction of the ditch, and cannot be ignored in the search for a solution. It consists of an earthy chalk rubble 15 to 18 inches thick, including the modern turf; and as usual it was quite easily distinguished from the layer below, the fine silt, in Colonel Hawley's words, being 'divided abruptly from the top layer'. Since it has been very slowly formed, it is sure to contain far more relics than the silt below, but they will be of all periods right up to modern times; and, because the deposit is shallow, there will be

difficulty in recognizing from their position which are the earlier objects and which the later.

Colonel Hawley says there is no stratification and that pottery of all ages from Early Bronze to Romano-British is jumbled together in any order. His explanation of it is that the material was introduced by the builders of Stonehenge:

When Stonehenge was built the movement of the numerous big stones and of many people, and the general disturbed state of the ground, brought the earthy chalk rubble layer over the silt. Objects of that period became mixed with it and deposited as we have found them. Later, in a quieter time, humus and turf were formed, and objects of subsequent periods have passed through the surface as we see it at present (Vol. II, pp. 50 and 51).

The explanation will answer for the introduction of the stone chips, which are plentiful throughout the layer, but gives no adequate reason for the late pottery becoming so thoroughly mixed with them, if there was, as he supposes, a long interval of time between. Surface cracks will allow small objects such as coins to work down to a considerable depth, and a brass cartridge case was actually found 18 inches below the surface. Worms will also lower stones by bringing up the earth below them, but this can take place only in mould and there can be very little movement in such obstructive material as the earthy chalk rubble: all that can happen is the sifting of fine earth to the top, and the relative order of the pottery will remain practically unchanged.

Unless therefore there is evidence of disturbance, the recognized principle in dating any layer is that the latest, not the earliest sherds give the clue.

The earlier sherds can be explained as having been present in the soil before the ditch was filled; but the later must be contemporary. Whole pots, easily broken, would of course be a different matter.

If the presence of the Romano-British pottery had been exceptional, it would be legitimate to put it down to a disturbance, such as burrowing animals, cracks, or worms; but the pottery was found all over the ditch and sometimes in quite large quantities. The contents of a portion 180 feet long are described in detail on pages 140 to 156 of Vol. VIII, and we are able from such a long length to get a good idea of the average finds. Nineteen sections were dug to clear this piece of trench, and Romano-British pottery was found in every one of them: the total of each kind of pottery is as follows:

Norman 3. Romano-British 136 in seventeen of the sections, and 'some' in the other two, or say 145 in all (excluding the fragments of a New Forest ware pot which were found together). 'Coarse ware', generally described as earlier in date, 36. 'Coarse black ware' found in one section and described as 'mostly of the Bronze Age', 30. Bronze Age 6. Beaker 1 in the top layer, and the two associated groups (of 10 and 12 small pieces) already referred to, lying on the silt.

The top layer includes of course the present turf, and the almost complete absence of anything later than Romano-British is remarkable. The definite Bronze Age pottery is also scanty, no more than might have been found in any soil in the neighbourhood; and the chief ingredients are the unspecified or doubtful coarse ware and the Romano-British.

Colonel Hawley supposed the ditch to be Neo-

lithic, and he is not likely to have paid very much attention to the top layer, containing as it does so much of Romano-British date; and one cannot help suspecting that there may have been more stratification than he supposed. Iron Age pottery is never mentioned in the reports, except a rather casual remark that the sherds in Z₄ were identified by Mr. Reginald Smith as La Tène (Vol. V, p. 32). The pottery, unlike the flints, has not been reported upon as a whole, and until that has been done it would be unwise to speculate too much; but it may be that the 'coarse ware of an earlier date' is Early Iron Age (Iron Age A perhaps), and that it occurs generally at a lower level than the Romano-British. Some of the so-called Romano-British, both from the ditch and interior, is really late, wheel-turned, Iron Age pottery (Iron Age C): for instance the so-called 'Romano-British' sherds in Z₅ are believed to have come from the same pot as in Z₄, and these last are undoubtedly 'bead-rim' pottery and late Iron Age in date (Vol. V, p. 47).

One would suspect therefore that nearly all the top layer pottery in the ditch ranges from Iron Age A to Romano-British; and there are no grounds for supposing the top layer is earlier than that in date.

As regards the ditch as a whole, the common supposition that it is Neolithic seems to be quite out of the question. Some seven or eight hundred cubic yards have been taken out and examined and nothing characteristic of that period, neither stone, bone, nor pot, has been found in it: no other ditch has been so called on such complete absence of evidence.

Until the 'coarse ware' has been identified one would hesitate to give the same definite 'no' to a Bronze Age date; but if it was as early as this one would expect to find in the top layer an easily recognized stratification, or perhaps a sterile layer between the Bronze Age and later pottery. Certainly, on the evidence we now have, an Early Iron Age date is much more likely.

Several cremations were found in the ditch, most of them in the silt, and therefore later than the ditch. There was one however on, or sunk into, the floor without any sign of being an intrusion (Vol. I, p. 34), which seems to have been contemporary. Since cremations are not known until after the Early Bronze Age, it affords further evidence of a later date.

No relics were found with these cremations, although it is sometimes said that a polished stone mace-head was associated with one of them. This is a mistake: the mace-head cremation was not in the ditch, but just below the surface on the inner side of the bank (Vol. V, p. 33). In such a position it might have been deposited at any time, before or after the monument, and can be of no value in dating Stonehenge. It was one among many very shallow and incomplete cremation burials, which were probably made by the modern Druids. They practise cremation and afterwards scatter the ashes, some to water, some to the air, and some were buried in the Stonehenge area. The last part of the ritual is now forbidden, and will no longer trouble archaeologists; but it is at least possible that even the mace-head cremation may have belonged to one of these with antiquarian tastes.

The bank was not excavated except for two narrow trenches cut through bank and ditch. It is generally considered the most reliable field for exploration, because anything found in the old turf line below it must have been sealed up since the earthwork was made; and Pitt Rivers has dated most of his sites from relics found in this position. It is difficult to understand therefore why it was neglected; but perhaps it is as well there should be still this field for future exploration, without trenching on the untouched northern area.

The surface soil inside the bank is described as similar to the top layer of the ditch, containing relics of all dates jumbled in any order. The great quantity of Romano-British pottery found here is commented on by Mr. Kendrick: as he says, it is far more than one would expect from trippers visiting the site to look on a ruin.

It is sometimes said that Stonehenge must be Neolithic because, to quote Mr. Stone, 'no weapon, tool, implement, ornament, bead, button, pin, or any fragment of any such article of bronze was ever found in the course of the excavations'. This of course is nonsense: a great many such objects were found and iron as well, in fact almost anything but what is distinctively Neolithic; but they were all in the 'top layer', and this, like hearsay, is considered no evidence. What he should have said is that none were found in the ditch silt or deep down in any of the holes, and that from these positions practically no relics of any kind were procured. And, he might have added, the barrenness of excavations is no proof of age.

There is, it is true, a resemblance between some

of the rough flints found in the stone holes and ditch, and the flints of Neolithic sites such as Cissbury; but both have been used to excavate chalk, and it is natural they should look alike: they are not finished tools which acquire a shape distinctive of the period.

The Aubrey Holes

The contents of these holes, like the silting from the ditch, was almost barren of relics, and nothing datable has been found near the bottom. Romano-British pottery might occur as low as 2 feet from the surface, or 8 or 9 inches below the level of the surrounding solid chalk; but this can be explained by the pieces slipping down as the wooden post decayed. It suggests that the posts, or their stumps, were still there when the pottery was scattered on the surface, nor is all the wood likely to have decayed until very much later. Aubrey noticed depressions there in the seventeenth century, so the holes were not quite filled up even then; it is hard to reconcile this with a date as early as the Bronze Age, but it gives no direct evidence.

The only direct evidence of any value comes from two holes. In hole No. 28 (*Antiquaries' Journal*, Vol. III, p. 16, where the hole is numbered 29; a comparison of the plan and text shows that the numbering of the holes in the early volumes has been amended), Colonel Hawley describes the finding of an 'interesting fragment of pottery' at a depth of 23 inches. It is a small 'incense cup', datable to the Middle Bronze Age; when complete it was less than an inch high and about $2\frac{1}{4}$ inches in diameter, and a third is missing. The 'fragment'

is of no more (or less) value in dating the hole than a potsherd of the same size; for it might have been lying in the soil when the hole was first dug and escaped breakage, just as it escaped breakage when Colonel Hawley excavated it. The other hole is No. 17 (*Antiquaries' Journal*, Vol. I, p. 33, where it is numbered 19; but see III, 15 and 16, and the plan in Vol. V), in which a dump of 'white flint flakes', some of which fitted, was found at a depth of 32 inches. We have a lot to learn about the patination of flint, and these flakes do not seem to have been examined by an expert; but flints so described suggest a Neolithic or Bronze Age date.

The Z and Y Holes

The reasons for supposing that these holes were never used for stones have been given in Chapter II; nor can they have been left open for long, as there is no sign of the weathered sides or the natural silting of an open hole. They must have been dug and filled up again after at least some of the blue stones were dressed, for their chips have been found at the bottom; and Colonel Hawley has suggested that they may have been intended for them. It is an important point which will be considered later; but first the pottery from them must be described.

So-called Romano-British sherds were found down to about half-way from the surface, but the exact depths are usually not recorded. In one instance, Y₃, it is given as 30 inches, and in another 21; but in the others the pottery is described as lying in the layer between 20 and 27, 19 and 27, &c. The really important evidence comes from Z₄ and Y₁₁ (Vol. V, pp. 29 and 43).

In Z₄ the top layer is 14 inches thick; and at 18 inches was found dirty soil mixed with burnt material and below that charred wood; below that again was 'a fairly level place holding natural flints indicating a roughly improvised hearth'. At about the same level were 42 pieces of 'black pot with plain round beaded wide mouth' (in other words 'bead-rim' pottery, Iron Age C). Still lower at 24 inches were three pieces of gritty pottery identified as Early Iron Age, La Tène, by Mr. Reginald Smith. The total depth was 41 inches, and the level of the surrounding chalk is shown in the section at about 16 inches below the surface.

Colonel Hawley thought the holes are contemporary with the monument, and that the Iron Age pottery owes its presence to a disturbance, the hole of Z₄ having been re-excavated for half its depth during the Early Iron Age for use as a hearth. Mr. Newall, who worked with Colonel Hawley, takes an entirely different view, and supposes that the holes are Iron Age in date and later than the monument, and that the pottery was thrown in with the remains of a fire when the hole was first filled.

Colonel Hawley does not explain what chance led to an old hole being re-excavated for a hearth, nor how the pottery and remains of fire occurred at different levels; and Mr. Newall's interpretation must surely be right—that the holes and pottery are contemporary and both Early Iron Age in date. This is confirmed by finding the same 'bead-rim' pottery in a neighbouring hole, Z₅, and also by the contents of Y11, where 104 pieces of Early Iron Age (Iron Age C) or Romano-British pottery were found close together at a depth of 15 inches. Evi-

dently pottery of this date was lying about when the Z and Y holes were filled.

Whether Mr. Newall is also right in supposing that the holes are later than the monument is another question that must now be considered.

The plan shows that both the alignment and spacing of the holes are very irregular: it almost looks as if they were meant to be ovals, and that owing to some blunder, one side is made to decrease in distance from the sarsen circle, while the other increases; consequently where the two curves ought to meet at about Z8, they actually overlap. However that may be, it is quite evident that the layout cannot be compared with that of the sarsen stones.

The sequence also appears to be unfinished, for no hole has been found for Z8, and its companion Y7 is only half dug. The hole for Z8 should come about where the sarsen stone No. 8 has fallen; and Mr. Newall has suggested that the stone was already down when the Z and Y holes were dug, and that it prevented the digging of Z8. It does not seem likely however that these rings should have been planned, knowing beforehand that they could not be completed; or that the distance from the sarsen circle should have been chosen so as to make the completion impossible; or, if stone No. 8 was found to be in the way, it could not have been moved or broken up.

Knowing that the holes were not used, it seems more likely that the digging was stopped because the stones intended for them were put somewhere else, and that it was stopped just where the extreme irregularity of the alignment became for the first

time conspicuous. The builders, if they wanted to remedy it, had the choice of an entirely new site, or of digging fresh holes and enlarging others, until their line was corrected. They did not enlarge the holes or make others on the same site, and the question is, did they choose a new one?

I think they did, and the new site is where now are the stones of the blue stone circle (but *not* the blue stone horseshoe); in other words that they built the circle.

For one thing, the stones of this circle are almost as badly aligned as the holes of the Z and Y rings, suggesting that the same people did both, and that they were not the builders of the rest of the monument. The alignment, it is true, is better; but it would have been hard to go very much wrong in the confined space between the sarsen circle and horseshoe. In neither case could they have used a picketed cord, because there were stones already in the way; but they could have measured them from the sarsen circle with quite satisfactory results; and instead of doing so, seem, like the builders of most stone circles, to have been content with guessing.

Then there is the close correspondence between the numbers of holes and stones, 60 holes and about 60 stones (see p. 12); and in their size, the average of 2 feet 8 inches by 1 foot 4 inches at the bottom with a depth of 3 feet, being exactly suited to the rather flat and narrow stones.

Lastly we have to ask what else can have happened to the stones for which these holes were dug? They must have been there at the time, for nobody would dig the holes for stones still to be fetched

from a distance, and there is no local source. They were not used in the holes, and unless they were broken up or buried or carried away, they must have been put up somewhere; and the only place where stones of the right number and size are (or rather were) to be found is in the blue stone circle. If they had been put anywhere else, we should find the remains or at least the holes where they stood.

The only alternative is to suppose that the Z and Y holes were dug with the intention, afterwards abandoned, of moving the blue stones from the circle into them. But it is most improbable that the necessity for moving them should have been felt, and the holes dug, and then nothing more done.

It seems safe to conclude therefore that the blue stone circle stones were originally intended for the Z and Y holes, and that they were put up soon after these holes were dug, that is to say late in the Early Iron Age.

Were it not for Colonel Hawley's excavations along the line of the blue stone circle, described on page 12, we should not have known that there were so many stones in the circle, and would have included the horseshoe as well to make up the full 60; and from this it would follow that all the blue stones were designed for the Z and Y holes and were late Iron Age in date. He has found however that the circle alone contained the required number, and with the 19 in the horseshoe added there would have been far too many.

A distinction must therefore be made between the two groups of blue stones: the circle is probably contemporary with the Z and Y holes and late Early

Iron Age; while the horseshoe is presumably the same date as the rest of the monument. Some confirmation of this view is afforded by the superior planning of the horseshoe stones (see p. 16); and by the presence of at least two lintel stones, which must have been made for another position, and therefore suggest a use of blue stones before the circle; and also perhaps by an alteration of the original plan of the horseshoe, for if it was first an oval, one end extended almost as far as the circle stones 31 and 49 and would have looked very awkward when the circle was added. Some weight must also be given to the fact that the horseshoe stones differ from the circle stones in being carefully trimmed to shape, but this may be due only to their superior position.

It is to the last degree unlikely that the foreign stones would have been brought from Wales at two different times, once for the horseshoe and once for the circle, so we may conclude they were already in Wiltshire on both occasions; and this view receives some confirmation from the fact that the trimming of the stones, perhaps to half their size, has been done at Stonehenge. If they had come direct all the way from Wales, it is only reasonable to suppose that this reduction in weight would have been made there. They may have been chosen for the reason suggested on page 40, or perhaps simply because they were nearer than the sarsens on Marlborough Downs. This of course would make the evidence of Boles Barrow useless for dating Stonehenge; and almost all the other evidence seems to lead to a similar conclusion.

Blue stone chips were everywhere found closely

associated with sarsen chips, and if the blue stones were all contemporary and late in the Early Iron Age, the sarsens would have to be too. But the chips may all have come from the horseshoe stones, which are the only ones much, if at all, worked, and it is not these, but the circle stones which are dated: that of the sarsens therefore still eludes us.

To sum up: the evidence of the Z and Y holes points to a late date in the Early Iron Age for the blue stone circle, but does not bear directly on the rest of the monument. All that can be said is that it was then a going concern.

The Tin Plate and the Green Stain

These are grouped together as the only evidence known from excavations at Stonehenge before Colonel Hawley's; and they are given more to complete the story than for their intrinsic worth: one is almost mythical and the other almost useless.

The tin plate or tablet is said by Stukeley to have been found

at this place in the time of king Henry VIII (the area of restitution of learning and pure religion) inscribed with many letters, but in so strange a character that neither Sir Thomas Elliot, a learned antiquary, nor Mr. Lilly, master of St. Paul's school, could make anything out of it.

Stukeley had no doubt it was 'wrote by the Druids', and regrets its loss as 'an invaluable curiosity'.

The green stain can be seen at the Devizes Museum on a fragment of sarsen. The sarsen was found by Professor Gowland in 1901 at a depth of about 6 feet in the foundation hole of stone No. 56. It has been analysed and proved to be car-

bonate of copper, and must have been caused by contact with some bronze or copper object; but the most careful search failed to find anything to account for it. It is thought some small scrap of copper such as a piece of wire or coin may have reached this depth through cracks in the earth, made perhaps when the stone was tilted over, and little or no weight is attached to it as evidence.

Snails

This is given last, not because it is least in value, for the strength of this kind of evidence has been steadily increasing, but because it is the latest of the clues to be published (see *Wilts. Arch. Mag.*, Dec. 1933), and is independent of all others. For some years past excavators of prehistoric earthworks have been submitting samples of the earth for analysis of their snail-shell contents. The snails are very small, almost microscopic, and belong to a large number of species, some of which like damp conditions and others dry; and by counting the number of each, it is possible to say what the climate was like when the earthwork was made, and whether the surroundings were open downland or wooded. At first the earthworks were dated by the archaeologist, and the information sought for was the climate at different periods; but so much has now been learnt that the climate, told by snails, is beginning to help the archaeologist. Sixteen earthworks (there are now two more, Whitehawk and Winterbourne Dauntsey, vide *Antiquaries Journal*, April 1934, and *Wilts. Arch. Mag.*, June 1934), all known to be Neolithic or Early Bronze Age (Beaker period), have been tested, and in every one their snails

enjoyed a climate much damper than ours. In the Middle Bronze Age the three earthworks examined show that the climate was getting dryer, but not so dry as now; and in the Early Iron Age the evidence becomes doubtful, some are rather wetter than now, and some show no difference.

Such an entirely consistent record, made in several counties, proves that the difference in climate is not merely local, due for instance to the growth of wood or scrub; and it seems safe to say that the Neolithic and Early Bronze Age in the south of England was decidedly wetter than now, and all earthworks of that time must have the damp-loving snails. In the Middle Bronze Age there is less certainty because the climate was getting dryer, and there have been fewer tests; but if snails only of the present-day species are met with, there must be a strong probability that the earthwork is Early Iron Age or Late Bronze Age at earliest.

Turning now to the Stonehenge record. Several samples of earth were taken from the ditch and from the post holes, and in all of them there was a total absence of the damp-loving species. It is confidently concluded that the conditions must have been the same as to-day, that is open downland without scrub, and that the climate was similar to ours.

CHAPTER VIII

CONCLUSION

THE evidence for date, omitting what is unimportant, may be summarized as follows.

Astronomical. (Chapter IV)

If stone No. 55 had not fallen, we should, I believe, have been able to get a reliable and fairly close estimate of the axial alignment and the date. As it is the direction of the axis cannot be known at all exactly, and the date determined by it may lie anywhere between our era and 800 B.C., or even beyond. Fortunately there appears to have been another virtually independent alignment on the Friar's Heel, which is close enough to the first to corroborate both. This gives a date between 500 B.C. and A.D. 500; and, since Post-Roman is ruled out on other grounds, they agree in putting it between our era and 500 B.C. Anything beyond this becomes more and more improbable as the date recedes.

Historical. (Page 89)

Hecataeus may have been referring to Stonehenge, and if so the monument would have been at its prime in the fourth century B.C. This fitted badly with the old orthodox Early Bronze or

Neolithic dating, and his evidence has been generally neglected. If however an Early Iron Age date is likely on other grounds, it becomes important: we should feel more certain that it was Stonehenge, and not another temple, he was writing about; and we should be able to place it in the Iron Age as fourth century or earlier (Iron Age A); but not later.

Megaliths. (Page 92)

Analogy with megaliths suggests a Neolithic or transition to Bronze Age period; but this kind of evidence is a broken reed, anyhow as far as Stonehenge is concerned.

Woodhenge. (Page 94)

If Woodhenge is correctly dated, and Stonehenge a copy, its date should be Middle Bronze Age, between 1200 and 1400 B.C.

Architectural Details. (Page 99)

The evidence is strong for an Early Iron Age date, and more probably late than early in the period.

Racial Evidence. (Page 101)

Is in favour of either Beaker or Early Iron Age; but not the Middle Bronze.

Boles Barrow. (Page 103)

The blue stone from this barrow either dates Stonehenge to the Long Barrow period (about 1800 B.C.) or does not help with the date at all. If on other grounds such an early date must be ruled

out, it proves that the blue stones were in Wiltshire before Stonehenge was built, and makes it possible for them to have been used there at two different times.

The Ditch. (Page 107)

The evidence is definitely against a Neolithic date, and Early Iron Age is much more probable than Bronze Age. Further light will be thrown on this if and when the pottery is published.

Aubrey Holes. (Page 115)

The evidence is conflicting and not of much value.

Z and Y Holes. (Page 116)

These are almost certainly late in the Early Iron Age (Iron Age C). Probably the blue stone circle was contemporary, and the rest of the monument earlier, but not so much earlier as to be in ruins, except perhaps the Aubrey posts.

Snails. (Page 123)

A Neolithic date seems impossible; Middle Bronze Age is very unlikely, Late Bronze less unlikely, and Early Iron Age the most probable.

In sifting this evidence the first thing to notice is that the very early date suggested by Boles Barrow conflicts with everything else. A Neolithic structure would not be a magnificent temple 1,400 years after it was built; a Neolithic ditch would not contain nothing distinctive of that period; the date is too early for the astronomical dating, and too early for

Woodhenge; the details of architecture are too advanced, and the snails are of the wrong species.

With the elimination of Boles Barrow the date would lie between 1400 B.C. and our era; and if Woodhenge was also eliminated, all the other evidence of any importance would agree and point to the Early Iron Age.

The Woodhenge argument however is more difficult to meet than that of Boles Barrow, although it may not be quite so strong as it looks; and some space must be given to examining it closely.

For one thing the similarity in dimensions may possibly be nothing more than an unusual coincidence. The principal 100-foot ring at Stonehenge may be an independent use of a natural unit and a natural notation; and there is a whole group of 100-foot circles in the north of England, which are not likely to have any connexion with Woodhenge (Cumberland and Westmorland Antiquarian and Archaeological Society, 1915). The blue stone circle is probably a later addition and therefore not a copy. The horseshoe curves are rather vague resemblances, while the blue stone horseshoe may have been designed as a much larger oval (see p. 16). Even the Aubrey circle may not be a duplication of the A ring at Woodhenge, for the posts are just clear of the inner edge of the bank, and their position may have been determined by that. The inner edge is about 300 feet in diameter (it is impossible to measure exactly), and the bank may have been designed to be three times the size of the sarsen circle, so that the interspaces should equal the circle.

The other points of resemblance however are

almost enough in themselves to show that Stonehenge borrowed from Woodhenge, though possibly not directly, and is therefore likely to be two or three hundred years later; but even if it is, the date of Woodhenge itself is not certain. The pottery found there has a notable absence of the cord ornament of the early Bronze periods, and the skeleton found at the bottom of the ditch is said to be Iron Age in character. A late Bronze or Early Iron Age date would not upset the snail evidence of Woodhenge, which is for a dryer climate than the Beaker period, but rather wetter than ours, and therefore similar to that of some of the Early Iron Age earthworks; and it would certainly agree very well with an Early Iron Age date for Stonehenge; but I do not feel competent to say whether it is possible.

The finding of more Woodhenge pottery associated with datable objects may help to clear the tangle, and we shall also get to know more as the snail evidence accumulates; and perhaps be able to say definitely that the modern species found at Stonehenge cannot be reconciled with a date earlier than the Iron Age. The complete clearing up of the mystery does not therefore depend only on further excavations at Stonehenge.

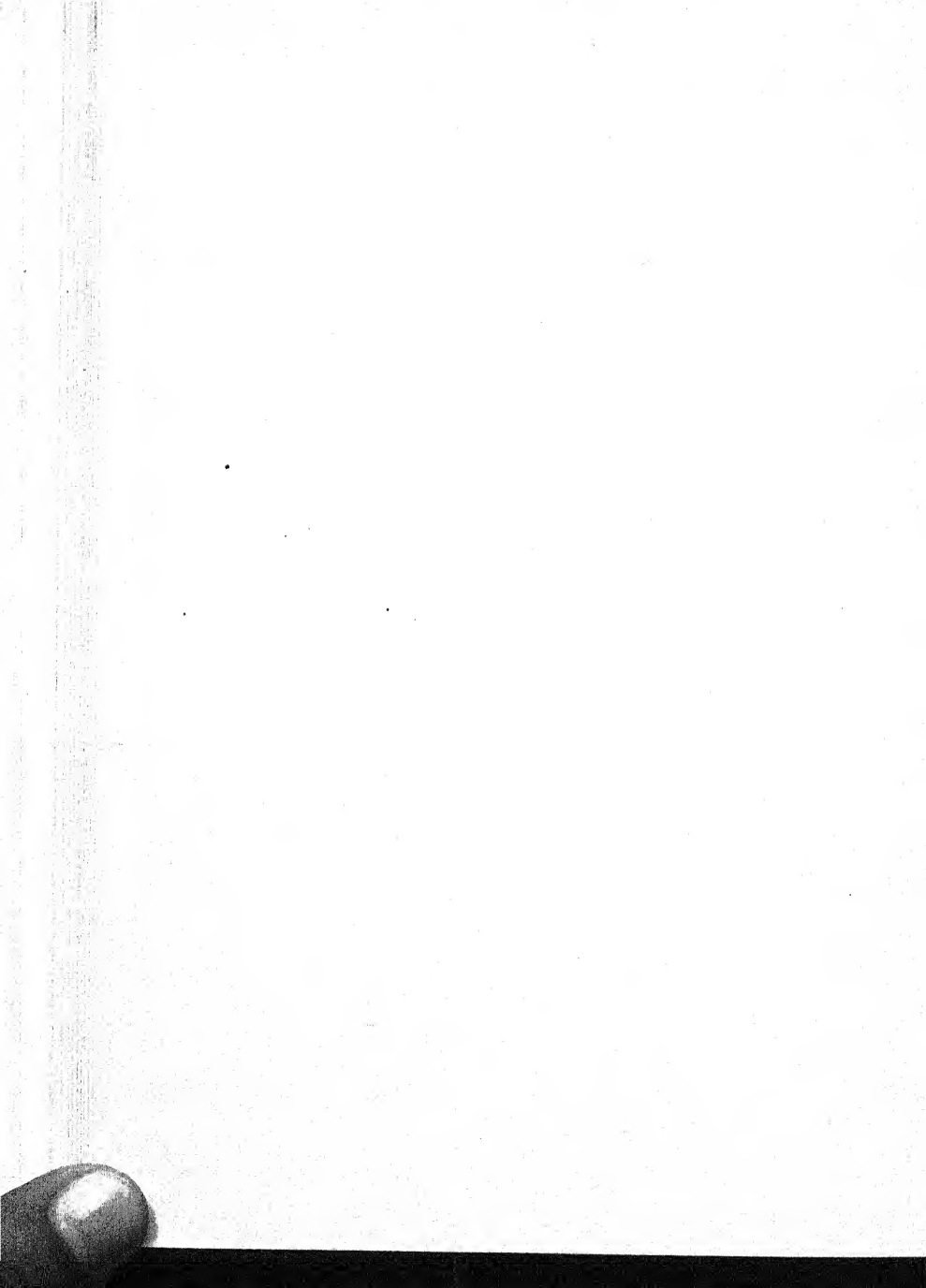
If the Woodhenge evidence is ignored and an Early Iron Age date accepted, there seem to be two reasons for putting it earlier than the first century B.C., suggested by Mr. Kendrick: the first is the fourth-century reference of Hecataeus, and the other is the probability of the Z and Y holes and blue stone circle being first-century additions to an older monument. The earlier date would allow for

Iron Age C and A pottery being found in the ditch, and it would mean that the monument remained in being for some 400 years, perhaps eventually to be 'slighted' by the conquering Romans. Druidism was an exception to the customary tolerance shown by the Romans towards strange religions, partly no doubt because of its political character, which may also have earned it its bad name as regards human sacrifice. Caesar describes how he destroyed a Druid's grove in Gaul, and if Stonehenge was the headquarters of Druidism it is not likely to have been spared at the conquest of Britain 100 years later. Deliberate destruction of one kind or another seems almost necessary to account for the loss of so many of the great stones (see note to Chapter I), and it certainly took place before the sixteenth century, and therefore long before the days of macadamized roads.

The blue stone circle, and perhaps the Four Stations, are likely to have been added after the Aubrey posts had fallen, and the restoration of these posts would naturally suggest substituting stones for the perishable timber; but why they should have been designed first as a double ring outside the sarsen circle (the Z and Y holes), and then as a single ring, almost a stone fence, inside (the blue stone circle), it is impossible to know. We can say at least that the work was badly, if not hurriedly done. The motive may have been that which Mr. Kendrick suggests for the whole monument, the need for reviving Druidism, after the beginning of the failure of the Order in Gaul.

To many minds the bringing of Stonehenge down from the far distant and mysterious Stone Age to

the Iron Age of the Celts, and the fourth or fifth century B.C., when we are almost on the verge of history, may seem a loss. Sentimentally perhaps it is, but it may be some compensation to feel that it was a people of our own blood, and not utter strangers, who built it; and that the inception may after all have been due to that romantic Order, the Druids.



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